City of Bellevue
Development Services Department
Land Use Staff Report

Proposal Name:	10418 NE 29th St – West Tributary to Yarrow Creek Stream Restoration
Proposal Address:	10418 NE 29th St
Proposal Description:	The City of Bellevue Utilities Department proposes to remove an existing culvert and in-stream embankment to restore a west tributary to Yarrow Creek (Stream 0254) to an open stream channel. The existing 24-inch diameter culvert conveys the creek beneath a 10-foot high embankment which encloses a 10-inch sewer pipe crossing the creek. The stream channel will be regraded and restored approximately 110 feet upstream and 150 feet downstream of the sewer pipe crossing. The project objective is to remove an existing fish passage barrier.
File Number:	18-124270-LO
Applicant:	Jay Hummel, City of Bellevue Utilities Department
Decisions Included	Critical Areas Land Use Permit (Process II. 20.30P)
Planner:	Peter Rosen, Senior Environmental Planner
State Environmental Policy Act Threshold Determination:	**Determination of Nonsignificance** Heidi M. Bullen for Carol V. Helland, Environmental Coordinator Development Services Department
Director's Decision:	**Approval with Conditions** Michael A. Brennan, Director Development Services Department By: Heidi M. Bullen for Elizabeth Stead, Land Use Director

Application Date:	September 10, 2018
Notice of Application Date:	October 4, 2018
Decision Publication Date:	February 7, 2019
Project Appeal Deadline:	February 21, 2019

For information on how to appeal a proposal, visit Development Services Center at City Hall or call (425) 452-6800. Appeal of the decision must be received in the City's Clerk's Office by 5 PM on the date noted for appeal of the decision.

CONTENTS

Attachments

1. Site Plans – Attached
2. Critical Areas Memorandum – Attached
3. Yarrow Tributary Buffer Enhancement Opportunities – Attached
4. Response to Comments - Attached

I. Proposal Description

The City of Bellevue Utilities Department proposes to remove an existing culvert, catch basin and embankment to restore a west tributary to Yarrow Creek (Stream 0254) to an open stream channel. The existing 24-inch diameter culvert is approximately 51-feet long and conveys the creek beneath a 10-foot high embankment that also encloses a 10-inch sewer pipe crossing the creek. With removal of the embankment, the sewer pipe will be protected in a 20-inch steel casing and the sewer pipe and casing will be supported by concrete piers to cross the stream. The precast concrete structures will be located outside the ordinary high-water mark (OHWM) and the sewer pipe elevated to provide a minimum of 1-foot clearance above the 100-year water surface elevation.

The proposal will remove an existing storm drain catch basin outfall near the culvert and replace it with an open outfall and an energy dissipater to mitigate for impacts to the streambed as a result of the discharge from the removal of the existing maintenance hole.

The stream channel will be regraded and restored approximately 110 feet upstream and 150 feet downstream of the sewer pipe crossing. The proposed channel restoration in the regraded channel will include installation of streambed sediment matching the existing gradation and pools with woody material harvested onsite installed to improve habitat function.

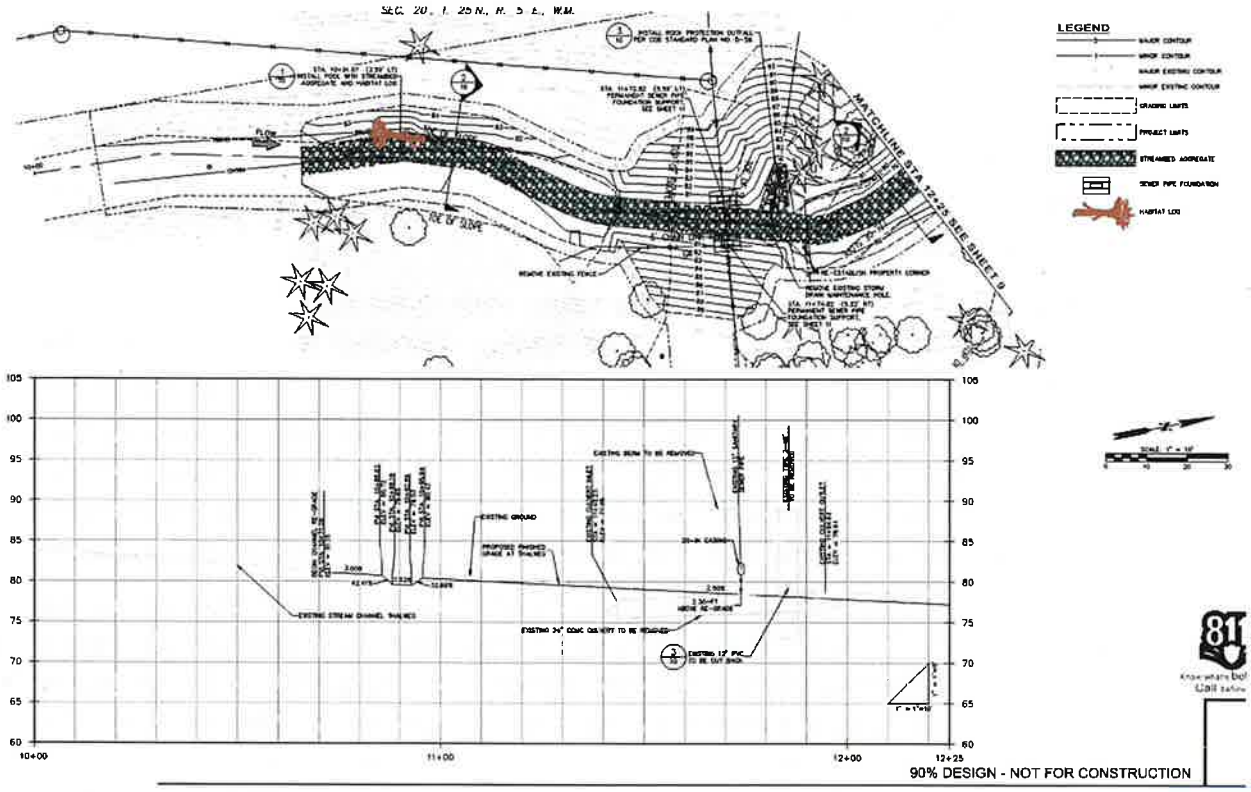
Disturbance of stream buffer vegetation will be minimized. A total of 20 trees may be removed. Approximately 10 Bigleaf Maple trees and 5 Red Cedar trees and various shrubs would be removed from the area within the stream regrade limits. An additional 5 trees may be removed for a construction access (see Sheets 4 and 5 of Site Plans, Attachment 1). The proposal includes a mitigation plan to install willows (Pacific willow species) into the stream regrade area, enhance 2 adjacent areas of the stream buffer (total of 1,960 SF), and to restore the construction access (See Sheet 12 of Site Plans, Attachment 1 and *Yarrow Tributary Buffer Enhancement Opportunities*, Attachment 3).

Temporary impacts during construction will be minimized by implementing Best Management Practices (BMPs) and by following Washington Department of Fish and Wildlife (WDFW) approved in-water work window protocols. Fish screens and gravel bag berms will be installed at both the upstream and downstream extents of the project. A stream bypass system will be installed and the stream will be effectively dewatered in the project location. These measures will minimize construction impacts to fish species.

The goal of the proposal to re-establish fish passage in the Yarrow Creek tributary to satisfy an agreement between the City of Bellevue, the Washington Department of Fish and Wildlife (WDFW) and the Muckleshoot Indian Tribe to mitigate for a small unnamed tributary to the Mercer Slough that was not able to achieve full fish passage.

A Critical Areas Land Use Permit is required for a project or activity that modifies or impacts a critical area or critical area buffer (LUC 20.25H.015.B). The proposal is identified as a *habitat improvement project*, which is an allowed use in critical areas/critical area buffers, provided applicable performance standards are met (LUC 20.25H.055.B) A Critical Areas Report is required for requests to modify code requirements and where a proposal modifies a stream channel (LUC 20.25H.080.B.1).

Figure 1 – Project Plan and Profile



II. Site Description, Zoning, Land Use and Critical Areas

A. Site Description

The west tributary to Yarrow Creek is identified as Stream 0254 on the City's GIS Mapshot system. The stream is classified as a Type F, fish bearing stream. There is no floodplain associated with the subject stream. The tributary flows north into Yarrow Creek near the SR 520 interchange (see Figure 1 – Project Location). The stream channel is highly confined both upstream and downstream of the existing culvert by high, steep valley walls. Upstream of the existing culvert the stream flows through a steep-sided narrow valley that is well-vegetated with native trees and shrubs which continue downstream of the culvert along the steep west bank. The east bank downstream of the culvert is confined by the adjacent parking lot and is dominated by dense Himalayan blackberry. Also, the channel downstream of the culvert appears to be incised through portion of the reach. The existing culvert was observed to be submerged on the upstream and downstream ends. Large pools have formed immediately upstream and downstream of the culvert. See Figure 2 – Site Conditions.

FIGURE 1 – PROJECT LOCATION

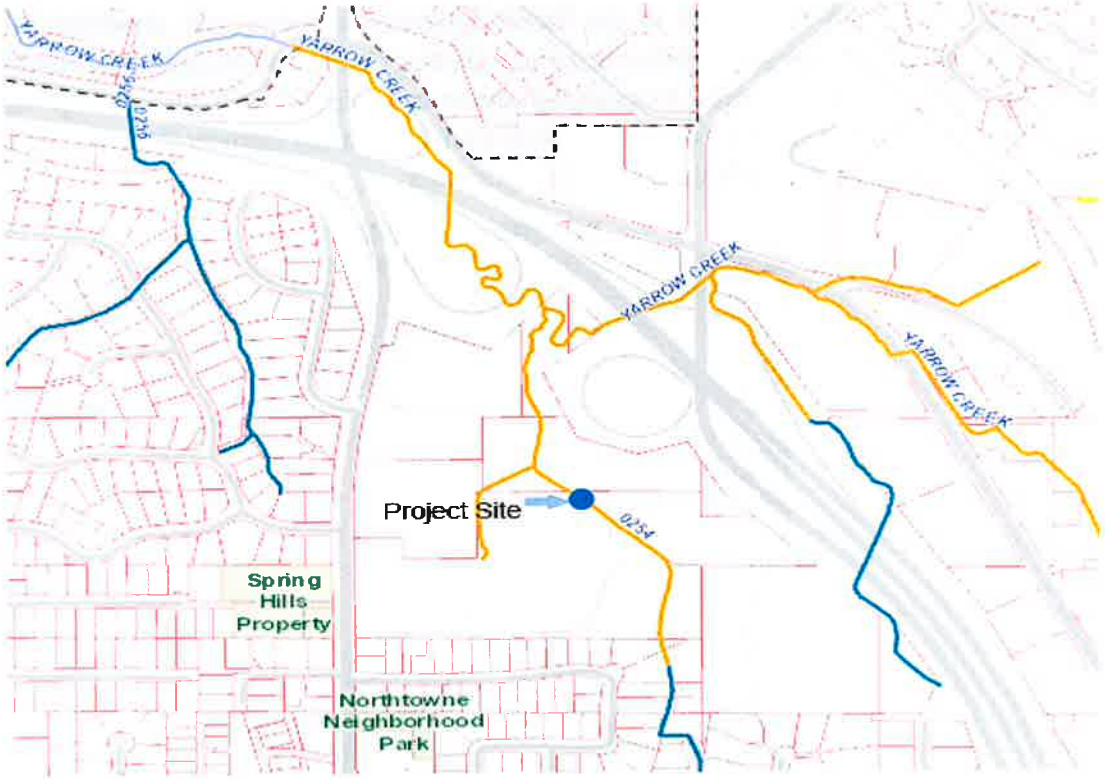
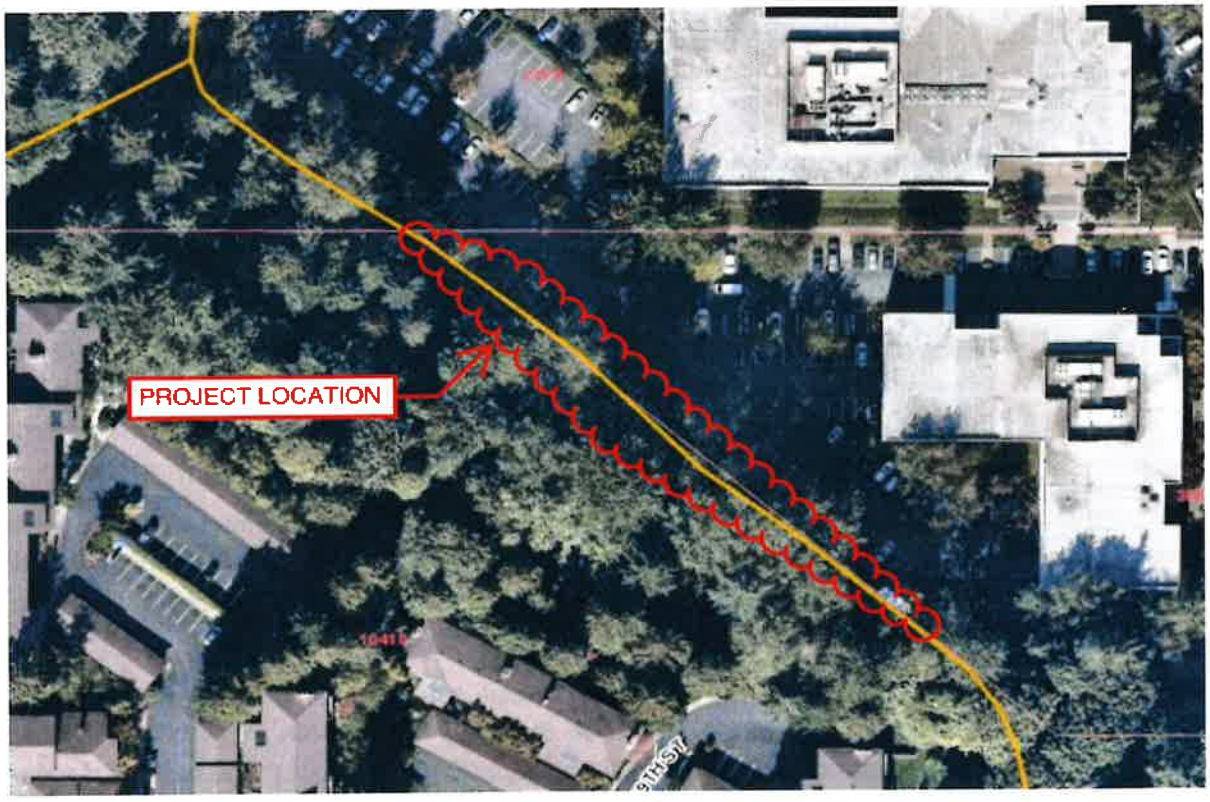


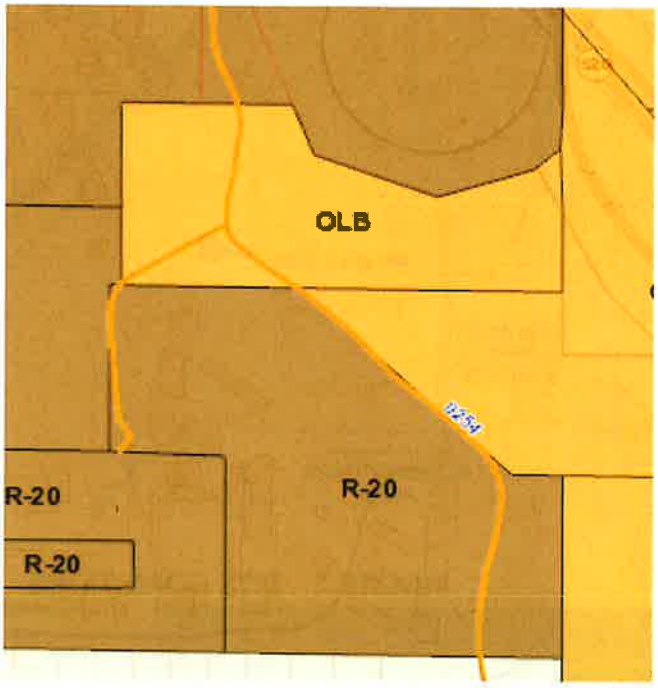
FIGURE 2 – SITE CONDITIONS



B. Zoning/Comprehensive Plan Designation

The project site is located in the North Bellevue subarea and straddles two zoning designations: Office and Limited Business District (OLB) and Multi-Family Residential (R-20). The Comprehensive Plan designations are aligned with the zoning: Office and Limited Business District (OLB) and Multi-Family Medium Density (MF-M). The proposal is an allowed activity in both zoning designations.

FIGURE 4 - ZONING



C. Critical Areas Functions and Values

i. Streams and Riparian Areas – LUC 20.25H.075

a. Stream and Riparian Area Functions: Most of the elements necessary for a healthy aquatic environment rely on processes sustained by dynamic interaction between the stream and the adjacent riparian area (Naiman et al., 1992). Riparian vegetation in floodplains and along stream banks provides a buffer to help mitigate the impacts of urbanization (Finkenbine et al., 2000 in Bolton and Shellberg, 2001). Riparian areas support healthy stream conditions.

Riparian vegetation, particularly forested riparian areas, affect water temperature by providing shade to reduce solar exposure and regulate high ambient air temperatures, slowing or preventing increases in water temperature (Brazier and Brown, 1973; Corbett and Lynch, 1985).

Upland and wetland riparian areas retain sediments, nutrients, pesticides, pathogens, and other pollutants that may be present in runoff, protecting water quality in streams (Ecology, 2001; City of Portland 2001). The roots of riparian plants also hold soil and prevent erosion and sedimentation that may affect spawning

success or other behaviors, such as feeding.

Both upland and wetland riparian areas reduce the effects of flood flows. Riparian areas and wetlands reduce and desynchronize peak crests and flow rates of floods (Novitzki, 1979; Verry and Boelter, 1979 in Mitsch and Gosselink, 1993). Upland and wetland areas can infiltrate floodflows, which in turn, are released to the stream as baseflow

Stream riparian areas, or buffers, can be a significant factor in determining the quality of wildlife habitat. For example, buffers comprised of native vegetation with multi-canopy structure, snags, and down logs provide habitat for the greatest range of wildlife species (McMillan, 2000). Vegetated riparian areas also provide a source of large woody debris that helps create and maintain diverse in-stream habitat, as well as create woody debris jams that store sediments and moderate flood velocities.

Sparsely vegetated or vegetated buffers with non-native species may not perform the needed functions of stream buffers. In cases where the buffer is not well vegetated, it is necessary to either increase the buffer width or require that the standard buffer width be restored or re-vegetated (May 2003). Until the newly planted buffer is established the near term goals for buffer functions may not be attained.

Riparian areas often have shallow groundwater tables, as well as areas where groundwater and surface waters interact. Groundwater flows out of riparian wetlands, seeps, and springs to support stream baseflows. Surface water that flows into riparian areas during floods or as direct precipitation infiltrates into groundwater in riparian areas and is stored for later discharge to the stream (Ecology, 2001; City of Portland, 2001).

III. Consistency with Land Use Code Requirements:

A. Zoning District Dimensional Requirements:

Zoning district dimensional requirements of the Land Use Code do not apply to the proposed activity.

B. Critical Areas Requirements LUC 20.25H:

The City of Bellevue Land Use Code Critical Areas Overlay District (LUC 20.25H) establishes performance standards and procedures that apply to development on any site which contains in whole or in part any portion designated as critical area, critical area buffer or structure setback from a critical area or buffer.

The proposal is identified as a *habitat improvement project*, which is an allowed use in critical areas, critical area buffers, and setbacks, provided applicable performance standards are met (LUC 20.25H.055.B).

i. Consistency with LUC 20.25H.055.C.3.j

j. Habitat Improvement Projects. Disturbance, clearing and grading are allowed in the critical area or critical area buffer for habitat improvement projects demonstrating an improvement to functions and values of a critical area or critical area buffer. Habitat improvement projects shall be:

i. Sponsored or cosponsored by a public agency or federally recognized tribe and whose primary function is habitat restoration; or

ii. Approved by the Director pursuant to LUC 20.25H.230.

Finding: The proposal complies with the code provision. The purpose of the project is habitat improvement; to remove an existing barrier to fish passage and to re-open the stream channel. The stream channel will be restored with streambed sediments and woody debris and the stream buffer enhanced with native tree and shrub species, demonstrating an improvement to critical area functions and values. The proposal is sponsored by the City of Bellevue and WDFW and the Muckleshoot Indian Tribe have been consulted on the project. A Critical Areas Report (LUC 20.25H.230) has been submitted with project application.

ii. Consistency with LUC 20.25H.080.A

A. Lights shall be directed away from the stream.

There will not be any change or addition to lighting in the project area. Potential sources of light are from the existing, surrounding office and apartment buildings and parking lots to the north and west of the site. Disturbed areas within the project area will be replanted with native trees and shrubs that will provide shade and filter lights from reaching the stream.

B. Activity that generates noise such as parking lots, generators, and residential uses, shall be located away from the stream, or any noise shall be minimized through use of design and insulation techniques.

No new development or activity that generates noise will be added as part of the project, beyond the noise necessary to construct the project.

C. Toxic runoff from new impervious area shall be routed away from the stream.

No new impervious surface area will be added as part of the project.

D. Treated water may be allowed to enter the stream critical area buffer.

The proposal will not create new impervious surface area and therefore will not construct stormwater facilities to treat runoff. However, the proposal will remove an existing storm drain catch basin outfall near the culvert and replace it with an open outfall and an energy dissipater to mitigate for impacts to the streambed as a result of the discharge from the removal of the existing maintenance hole.

E. The outer edge of the stream critical area buffer shall be planted with dense vegetation to limit pet or human use. Preference shall be given to native species.

Opportunities for enhancing the stream buffer were evaluated based on existing vegetation, site conditions and surrounding property ownership constraints. See *Yarrow Tributary Buffer Enhancement Opportunities*, Attachment 3. The proposal includes a mitigation planting plan identifying 2 adjacent stream buffer areas (total of 1,960 SF) that would be enhanced with native trees and shrubs. See Sheet 12 of Site Plans, Attachment 1. The proposed buffer planting would limit pet and human access to the stream buffer and the creek.

A final mitigation plan is required to be submitted and approved with a Clearing and Grading permit application. The mitigation planting is required to be maintained and monitored for five years. The final mitigation plan shall include performance standards to measure the successful establishment of the mitigation plantings. Acceptable performance standards are listed in the conditions of approval. **See Section X for a related condition of approval.**

F. Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream critical area buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices", now or as hereafter amended.

The Critical Areas Report states that pesticides and insecticides are not expected to be used as part of the project. The use of fertilizers for plant establishment within 150 feet of the stream buffer will be in accordance with the City of Bellevue's "Environmental Best Management Practices."

IV. Public Notice and Comment

Application Date:	September 10, 2018
Public Notice (500 feet):	October 4, 2018
Minimum Comment Period:	October 18, 2018

The Notice of Application for this project was published in the City of Bellevue Weekly Permit Bulletin and Seattle Times on October 4, 2018. It was mailed to property owners within 500 feet of the project site. Two comments were received:

Michele Hope, a resident in a nearby apartment, requested information on the type of disturbance and noise impacts and duration of the project. Information was provided back to Ms. Hope that the construction work will be limited to weekday work hours and the construction work is estimated to be completed between July and September 2019.

Karen Walter from the Muckleshoot Indian Tribe also commented that the project should put all removed trees (4-inches or greater) back into the stream and requested more

details on existing and proposed sediment sizes to be used for streambed materials. The City's consultant responded to the comments (Osborn Consulting, Inc., November 30, 2018) stating that two pools with woody material are included in the proposed design both upstream and downstream of the sewer pipe crossing and that the woody material will be sourced from on-site trees that will be removed. The channel profile and slope changes were designed to reflect the natural channel as well as promote sediment transport and minimize aggradation below the sewer pipe crossing. Woody materials are limited to the two habitat pools to prevent sediment recruitment and deposition below the sewer pipe crossing. Excess woody materials placement could potentially create an upstream sediment wedge that could decrease the channel gradient and reduce downstream bedload conveyance. Sediment deposition must be minimized in order to protect the integrity of the sanitary sewer pipe crossing and comply with the clearance requirements in WDFW's Water Crossing Design Guidelines. The response back to Ms. Walter also included the Preliminary Design Technical Memorandum (Osborn Consulting, Inc., November 30, 2018), which provides the basis for the streambed material sizing. The response to comments is included as Attachment 4.

V. Summary of Technical Reviews

A. Clearing and Grading

The Clearing and Grading Division of the Development Services Department reviewed the proposal for compliance with Clearing and Grading codes and standards and has approved the application.

VI. State Environmental Policy Act (SEPA)

The environmental review indicates no probability of significant adverse environmental impacts occurring as a result of the proposal. The Environmental Checklist submitted with the application adequately discloses expected environmental impacts associated with the project. The City codes and requirements, including the Clear and Grade Code, Utility Code, Land Use Code, Noise Ordinance, Building Code and other construction codes are expected to mitigate potential environmental impacts. Therefore, issuance of a Determination of Non-Significance (DNS) is the appropriate threshold determination under the State Environmental Policy Act (SEPA) requirements.

A. Earth and Water

The applicant will be required to obtain a clearing and grading permit and follow erosion and sediment control best management practices to prevent sediment impacts. The project will be constructed during the summer months to reduce the potential for erosion and sediment transport. **See Conditions of Approval in Section IX of this report**

B. Animals

All in-stream work activities will be conducted during the WDFW-approved in-water work window to ensure minimal effects on fish and salmonid species. Fish screens and gravel bag berms will be installed at both the upstream and downstream extents of the project. A stream bypass system will be installed and the stream will be effectively dewatered in

the project location. Water from the work zone will be isolated through a dewatering well and released into upland habitat. Turbidity will be monitored and minimized to prevent risks to fish downstream of the project location.

All in-water work is required to occur within the construction window as established by state and federal agencies to minimize or avoid impacts to fish and wildlife. **See Conditions of Approval in Section X of this report**

C. Plants

Graded, excavated, disturbed areas will be revegetated with native plant species and the stream buffer enhanced. The plantings will stabilize the streambanks and improve habitat functions.

VII. Changes to Proposal Due to Staff Review

Land Use Review requested the applicant to evaluate opportunities for stream buffer enhancement to mitigate for tree removal impacts and to meet the code performance standard requiring planting the outer stream buffer. The applicant identified appropriate areas for stream buffer enhancement based on existing vegetation, site conditions and surrounding property ownership constraints (*Yarrow Tributary Buffer Enhancement Opportunities,* Attachment 3). The proposed mitigation planting plan was revised to add the 2 stream buffer enhancement areas (total of 1,960 SF), Sheet 13 of Site Plans, Attachment 1.

VIII. Decision Criteria

A. 20.30P.140 Critical Area Land Use Permit Decision Criteria – Decision Criteria

The Director may approve, or approve with modifications an application for a Critical Area Land Use Permit if:

1. **The proposal obtains all other permits required by the Land Use Code.**

   Finding: All required construction permits will be obtained. **See Conditions of Approval in Section X of this report.**

2. **The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer.**

   Finding: A Technical Memorandum (Osborn Consulting, Inc., November 30, 2018) was prepared to evaluate hydrologic and hydraulic criteria and modeling for the project design, to result in the least impact of the critical area and buffer.

3. **The proposal incorporates the performance standards of Part 20.25H to the maximum extent applicable.**

   Finding: The proposal incorporates the performance standards related to streams to the maximum extent applicable, as discussed and conditioned in Section III above.

4. **The proposal will be served by adequate public facilities including street, fire protection, and utilities.**

   Finding: Adequate public facilities are available to the site and the proposal would not increase the demand for public facilities and utilities.

5. **The proposal includes a mitigation or restoration plan consistent with the requirements of LUC Section 20.25H.210.**

   Finding: The proposal includes a mitigation plan to revegetate disturbed and graded areas and to enhance the stream buffer with native plant species, consistent with the requirements of 20.25H.210. A final mitigation/restoration planting plan shall be included with the construction permit application and shall include performance standards to monitor the success of the mitigation planting. **See Conditions of Approval in Section X of this report.**

6. **The proposal complies with other applicable requirements of this code.**

   Finding: As discussed in this report, the proposal complies with all other applicable requirements of the Land Use Code.

B. Critical Areas Report Decision Criteria- General Criteria LUC 20.25H.255

The Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;

Finding: The proposal is a habitat improvement project; it would remove an existing fish passage barrier, plant the regarded stream area, and enhance the stream buffer with native plantings improving habitat and critical area functions. The proposal demonstrates that the proposed modifications will be at least as protective of the critical area functions and values as with the strict application of the regulations and standards of the Land Use Code.

2. Adequate resources to ensure completion of any required mitigation and monitoring efforts;

Finding: The project is managed by the City of Bellevue Utilities Department. The Department has adequate resources to satisfactorily complete the project and to comply with the mitigation and monitoring required.

3. The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and

Finding: The proposal is a habitat improvement project; it would remove an existing fish passage barrier and enhance the stream and stream buffer with native plantings to

improve habitat and critical area functions. Stream modelling was conducted to ensure that removal of the berm would not result in downstream issues due to increased velocities or surface water elevations.

4. The resulting development is compatible with other uses and development in the same land use district.

Finding: No changes to land uses are proposed and the proposal is compatible with other uses and development in the vicinity.

IX. Conclusion and Decision

After conducting the various administrative reviews associated with this proposal, including Land Use Code consistency, City Code and Standard compliance reviews, the Director of the Development Services Department does hereby **approve with conditions** the removal of an existing culvert and in-stream embankment to restore a west tributary to Yarrow Creek (Stream 0254) to an open stream channel.

Approval of this Critical Areas Land Use Permit does not constitute a permit for construction. Separate construction permits are required and all plans are subject to review for compliance with applicable City of Bellevue codes and standards.

Note- Expiration of Approval: In accordance with LUC 20.30P.150 a Critical Areas Land Use Permit automatically expires and is void if the applicant fails to file for a construction permit or other necessary development permits within one year of the effective date of the approval.

X. Conditions of Approval

The applicant shall comply with all applicable Bellevue City Codes and Ordinances including but not limited to:

Applicable Ordinances	Contact Person
Clearing and Grading Code- BCC 23.76	Janney Gwo, 425-452-6190
Land Use Code- BCC Title 20	Peter Rosen, 425-452-5210

The following conditions are imposed under the Bellevue City Code as referenced:

1. **Clearing and Grading Permit Required:** An application for a clearing and grading permit must be submitted and approved before construction can begin. Plans submitted as part of the permit application shall be consistent with the plans and activity permitted under this approval.

   Authority: Land Use Code 20.30P.140
   Clearing & Grading Code 23.76.035

   Reviewer: Janney Gwo, Clearing & Grading Section

2. **Tree Protection:** The clearing and grading permit submittal shall show tree protection measures to protect trees that have not been identified for removal from construction activity.

   Authority: Land Use Code 20.30P.140
   Reviewer: Peter Rosen, Development Services Department

3. **Final Mitigation Plan:** A final mitigation planting plan shall be submitted with the clearing and grading permit. The plans shall specify plant species, sizes, quantities and spacing. The final mitigation plan shall also include performance standards to measure the successful establishment of the mitigation plantings. The following performance standards are required:

   Year 1 (from date of plant installation)

   - 100% survival of all installed plants and/or replanting in following dormant season to reestablish 100%
   - Less than 5% cover of non-regulated Class A, B, or C noxious weeds as identified on the King County Noxious Weed List.
   - No (0%) regulated Class A, B, or C noxious weeds.

   Year 2 (from date of plant installation)

   - Greater than 40% cover of installed and volunteer native plants.
   - Less than 5% cover of non-regulated Class A, B, or C noxious weeds as identified on the King County Noxious Weed List.
   - No (0%) regulated Class A, B, or C noxious weeds.

   Year 3

   - Greater than 60% cover of installed and volunteer native plants.
   - Less than 10% cover of non-regulated Class A, B, or C noxious weeds as identified on the King County Noxious Weed List.
   - No (0%) regulated Class A, B, or C noxious weeds.

   Year 4

   - Greater than 75% cover of installed and volunteer native plants.
   - Less than 15% cover of non-regulated Class A, B, or C noxious weeds as identified on the King County Noxious Weed List.
   - No (0%) regulated Class A, B, or C noxious weeds.

   Year 5

   - Greater than 80% cover of installed and volunteer native plants.
   - Less than 15% cover of non-regulated Class A, B, or C noxious weeds as identified on the King County Noxious Weed List.

- No (0%) regulated Class A, B, or C noxious weeds.

Authority: Land Use Code 20.30P.140; 20.25H.220
Reviewer: Peter Rosen, Development Services Department

4. **Maintenance and Monitoring:** The mitigation planting is required to be maintained and monitored for five years to ensure the plants successfully establish. Annual monitoring reports are required to be submitted to document the planting is meeting approved performance standards. Monitoring reports shall be submitted by December 31st of each year to the Environmental Planning Manager for the Land Use Division of Development Services. Monitoring reports must reference the project by name and include the relevant permit numbers.

   Authority: Land Use Code 20.30P.140; 20.25H.220
   Reviewer: Peter Rosen, Development Services Department

5. **In-Water Work Window:** To prevent impacts or disturbance to fish species, work in the active channel approved by the underlying clearing and grading permit must be completed during an in-water work window of July 1 to August 31 unless an exception has been granted in writing by the Washington Department of Fish and Wildlife (WDFW).

   Authority: Land Use Code 20.25H.160
   Reviewer: Peter Rosen, Land Use

ATTACHMENT 1

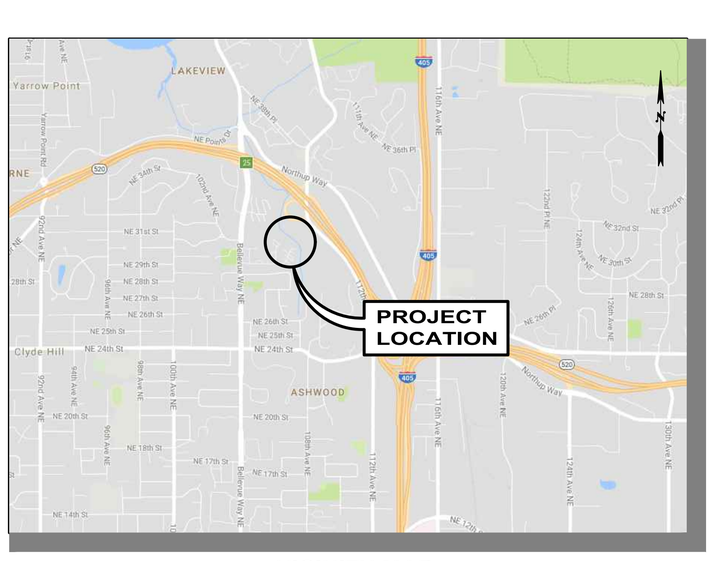
CITY OF BELLEVUE

2830 107TH AVE NE FISH PASSAGE (YARROW CREEK TRIBUTARY) BELLEVUE, WA 98004

C.I.P. D-81

CITY OFFICIALS

JOHN STOKES	MAYOR
JOHN CHELMINIAK	DEPUTY MAYOR
BRAD MIYAKE	CITY MANAGER
NAV OTAL	DIRECTOR OF UTILITIES
CONRAD LEE	COUNCILMEMBER
JENNIFER ROBERTSON	COUNCILMEMBER
LYNNE ROBINSON	COUNCILMEMBER
ERNIE SIMAS	COUNCILMEMBER
KEVIN WALLACE	COUNCILMEMBER



VICINITY MAP
N.T.S.

SHEET INDEX

SHEET #	SHEET TITLE
1	COVER SHEET, VICINITY MAP, AND SHEET INDEX
2	LEGEND AND ABBREVIATIONS
3	SURVEY CONTROL PLAN
4	EROSION CONTROL AND STREAM BYPASS PLAN
5	EROSION CONTROL AND STREAM BYPASS PLAN
6	EROSION CONTROL AND STREAM BYPASS DETAILS
7	EROSION CONTROL NOTES
8	TEMPORARY CONSTRUCTION EASEMENT PLAN
9	PLAN AND PROFILE
10	PLAN AND PROFILE
11	STREAM DETAILS
12	PIPE SUPPORT DETAILS
13	PLANTING PLAN
14	PLANTING DETAILS

811 Know what's below. Call before you dig.

ISABELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.				City of Bellevue	YARROW CREEK
DRAWN BY AKS		1800 112th Ave. NE, Suite 220E Ph (425) 451-4009					CITY OF BELLEVUE
CHECKED BY TJO		Bellevue, WA. 98004 Fax (888) 391-8517					COVER SHEET, VICINITY MAP, AND SHEET INDEX
			NO.	DATE	REVISION	BY	

JOB# / DWG: 10-150071_T02 | DATE: 2/15/19 | SCALE: H: N/A V: N/A | SHEET: 1 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_COVR.DWG
PLOT TIME: 1/28/2019 12:30 PM
USER NAME:ALEKSANDRA SLATALA

ABBREVIATIONS:

ADT	AVERAGE DAILY TRAFFIC
APPROX.	APPROXIMATE, APPROXIMATELY
BMP	BEST MANAGEMENT PRACTICE
BW	BOTTOM OF WALL
CFS	CUBIC FEET PER SECOND
CHNL	CHANNEL
CL	CENTERLINE
CONC	CONCRETE
CMP	CORRUGATED METAL PIPE
CTR	CENTER
CY	CUBIC YARDS
DI	DUCTILE IRON
DIA	DIAMETER
E	EAST, EASTING
ELEV	ELEVATION
FLEX	FLEXIBLE
FT	FOOT, FEET
HPA	HYDRAULIC PROJECT APPROVAL
HVF	HIGH VISIBILITY FENCE
IE	INVERT ELEVATION
LCL	LOCAL LOW POINT
MAX	MAXIMUM
MPH	MILES PER HOUR
MON	MONUMENT
N	NORTH, NORTHING
N.T.S.	NOT TO SCALE
NUD	NORTHSHORE UTILITY DISTRICT
OHWM	ORDINARY HIGH WATER MARK
RJ	RESTRAINED JOINT
ROW	RIGHT OF WAY
RXR	RAILROAD
S	SOUTH
SF	SQUARE FEET
STA.	STATION
SSMH	SANITARY SEWER MANHOLE
TBM	TEMPORARY BENCHMARK
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
W	WEST
XFMR	TRANSFORMER

LEGEND

PROPOSED

- PROJECT LIMITS
- AREA OF LIMITS AND RE-GRADING
- HIGH VISIBILITY FENCE (HVF) (HVF)
- FORCE MAIN (FM)
- FISH SCREEN
- DITCH
- MAJOR CONTOUR (5)
- MINOR CONTOUR (1)
- MAJOR EXISTING CONTOUR
- MINOR EXISTING CONTOUR
- STORM DRAINAGE LINE
- CULVERT
- STREAMBED AGGREGATE
- STABILIZED CONSTRUCTION ENTRANCE
- TEMPORARY RIPRAP MAT
- SEDIMENT MAT
- PLANTING ZONE 1
- STREAM REGRADE AREA
- LANDSCAPE AREA
- TEMPORARY EASTMENT
- INLET PROTECTION
- PUMP (P)
- TURBIDITY MONITORING STATION (M)
- GRAVEL BAG
- REMOVE TREE (X)
- PROTECT TREE

EXISTING

- FOUND CASED MONUMENT
- FOUND SURFACE MONUMENT
- FOUND REBAR AND CAP
- SET MAG NAIL
- SET REBAR WITH CAP
- DECIDUOUS TREE
- CONIFEROUS TREE
- CATCH BASIN
- MANHOLE STORM
- SEWER CLEAN OUT
- MANHOLE SEWER
- POWER TRANSFORMER
- GATE POST
- STAND PIPE
- FIRE HYDRANT
- WATER VALVE
- COMMUNICATION LOCATES (T)
- POWER LOCATES (P)
- WATER LOCATES (W)
- STREAM LINE
- ORDINARY HIGH WATER
- CHAIN LINK FENCE
- BUILDING
- UNDERGROUND SEWER (SS)
- UNDERGROUND STORM (SD)
- EDGE OF ASPHALT

811 Know what's below. Call before you dig.

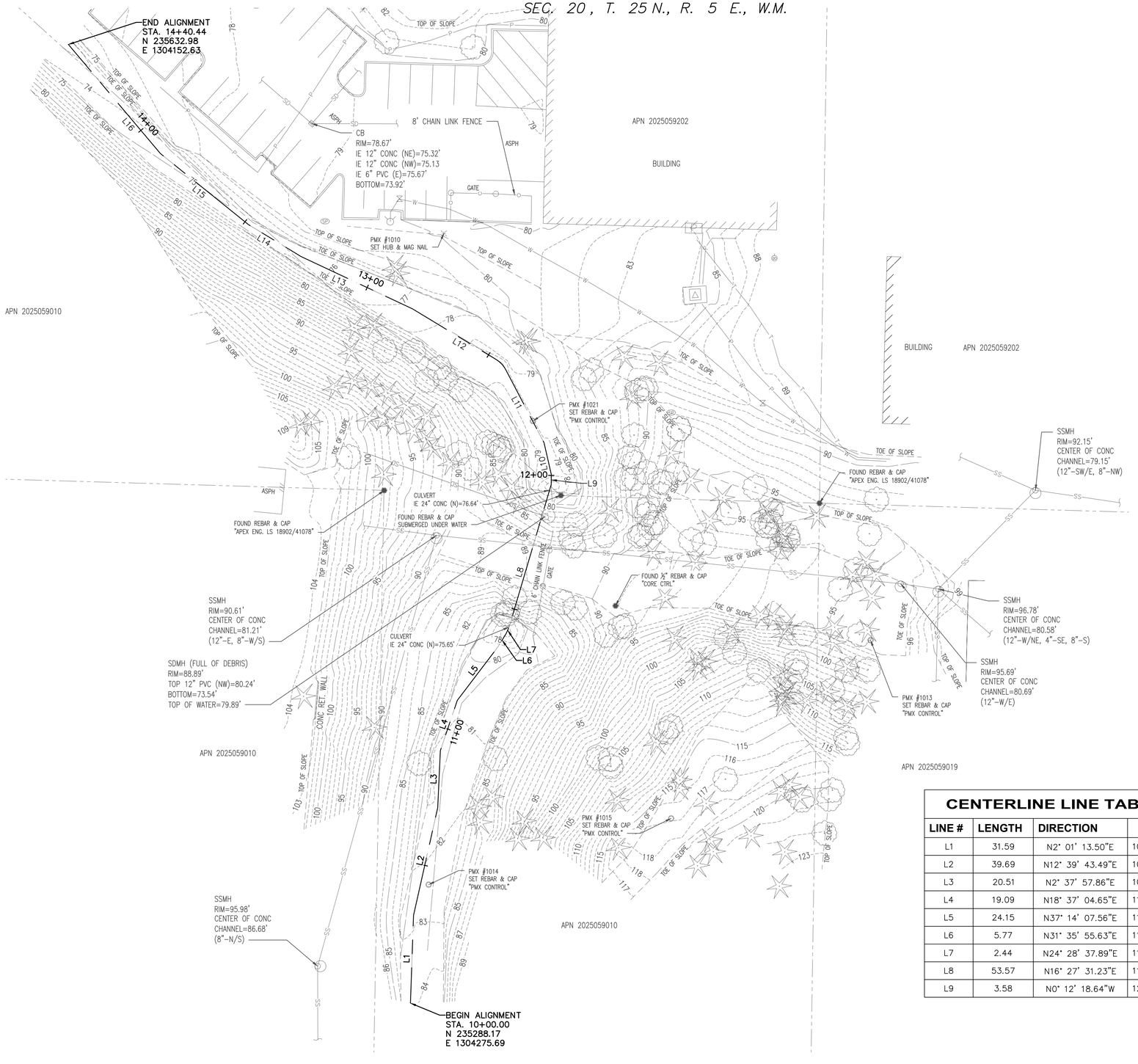
TARELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.				City of Bellevue	YARROW CREEK
DRAWN BY AKS		1800 112th Ave. NE, Suite 220E Ph (425) 451-4009					CITY OF BELLEVUE
CHECKED BY TJO		Bellevue, WA. 98004 Fax (888) 391-8517	NO.	DATE	REVISION	BY	LEGEND AND ABBREVIATIONS

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: N/A V: N/A	SHEET 2 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_COVR.DWG
PLOT TIME: 1/28/2019 12:30 PM
USER NAME:ALEKSANDRA SLATALA

SEC. 20 , T. 25 N., R. 5 E., W.M.



PMX CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	RAW DESCRIPTION
1007	235755.18	1304580.81	82.75	SET REBAR & CAP
1008	235933.25	1303991.55	67.72	SET MAG NAIL
1009	235781.20	1304206.95	77.25	SET MAG NAIL
1013	235418.70	1304441.21	95.25	SET REBAR & CAP
1014	235330.79	1304282.25	82.96	SET REBAR & CAP
1015	235354.60	1304369.49	117.61	SET REBAR & CAP
1016	235433.20	1304673.42	98.74	SET MAG NAIL
1021	235497.52	1304319.74	79.21	SET REBAR & CAP

HORIZONTAL DATUM:

HORIZONTAL DATUM FOR THIS SURVEY IS NAD 1983/11 BASED ON ON GPS SURVEY OBSERVATIONS ON THE FOLLOWING MONUMENTS PUBLISHED BY CITY OF BELLEVUE.

POINT DESIGNATION H3051 (PMX #1001)
NORTHING: 235012.802
EASTING: 1303972.590

POINT DESIGNATION H3052 (PMX #1002)
NORTHING: 234974.225
EASTING: 1303658.084

VERTICAL DATUM

VERTICAL DATUM FOR THIS SURVEY IS NAVD 88 BASED ON THE FOLLOWING MONUMENT PUBLISHED BY CITY OF BELLEVUE.

POINT DESIGNATION V1063 (PMX #1006)
ELEVATION: 59.776'

SURVEY NOTES:

1. THIS MAP CORRECTLY REPRESENTS CONDITIONS AND FEATURES EXISTING AT THE TIME OF THIS SURVEY IN JULY, 2017.

2. CONVENTIONAL AND GPS SURVEY EQUIPMENT WAS USED IN THE PERFORMANCE OF THIS SURVEY. ALL EQUIPMENT IS MAINTAINED IN CONFORMANCE WITH CURRENT STATE STATUTE.

3. THIS SURVEY WAS PREPARED BY FIELD TRAVERSE AS PER WAC 332-130-090, PART C. RELATIVE ACCURACY EXCEEDS 1 FOOT IN TEN THOUSAND.

4. ALL SURFACE FEATURES AND INVERT STRUCTURE ELEVATION SHOWN HEREON WERE FIELD LOCATED AND MEASURED BY PARAMETRIX FOR THIS SURVEY. UNDERGROUND UTILITY LINES ARE BASED UPON A COMBINATION OF ASBUILT PLANS, SURFACE FEATURE MEASUREMENTS AND ONSITE UNDERGROUND UTILITY MARKINGS PERFORMED BY OTHERS.

5. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

6. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT, WHICH MAY REVEAL RESTRICTIONS OR EASEMENTS OF RECORD. ACCORDINGLY, NONE ARE SHOWN HEREON.

CENTERLINE LINE TABLE			
LINE #	LENGTH	DIRECTION	PI
L1	31.59	N2° 01' 13.50"E	10+31.59
L2	39.69	N12° 39' 43.49"E	10+71.28
L3	20.51	N2° 37' 57.86"E	10+91.79
L4	19.09	N18° 37' 04.65"E	11+10.88
L5	24.15	N37° 14' 07.56"E	11+35.03
L6	5.77	N31° 35' 55.63"E	11+40.80
L7	2.44	N24° 28' 37.89"E	11+43.23
L8	53.57	N16° 27' 31.23"E	11+96.80
L9	3.58	N0° 12' 18.64"W	12+00.38

CENTERLINE LINE TABLE			
LINE #	LENGTH	DIRECTION	PI
L10	11.66	N12° 52' 07.70"W	12+12.05
L11	29.46	N27° 39' 11.32"W	12+41.51
L12	34.98	N58° 49' 06.78"W	12+81.93
L13	44.36	N64° 50' 19.33"W	13+26.29
L14	22.10	N58° 44' 53.43"W	13+48.39
L15	40.72	N51° 06' 07.55"W	13+89.11
L16	51.33	N40° 09' 02.90"W	14+40.44

N

SCALE: 1" = 20'
0 20 40 60

811
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MARELLE OSBORN
STATE OF WASHINGTON
41694
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
IMF	AKS	TJO

OSBORN CONSULTING INCORPORATED

OSBORN CONSULTING, INC.
1800 112th Ave. NE, Suite 220E Ph (425) 451-4009
Bellevue, WA. 98004 Fax (888) 391-8517

NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
SURVEY CONTROL PLAN

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE	SHEET
H: 1"=20' V: N/A	3 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_COVR.DWG
PLOT TIME: 1/28/2019 12:30 PM
USER NAME:ALEKSANDRA SLATALA

SEC. 20 , T. 25 N., R. 5 E., W.M.

TEMPORARY STREAM BYPASS CONSTRUCTION NOTES

1. INSTALL FISH SCREEN. (1/6)
2. INSTALL TEMPORARY RIPRAP MAT TO PREVENT EROSION AT TEMPORARY BYPASS OUTFALL. ALL RIPRAP SHALL BE REMOVED WHEN CONSTRUCTION IS COMPLETE. (3/6)
3. INSTALL SEDIMENT MAT. (2/6)
4. INSTALL TEMPORARY STREAM BYPASS PIPE. ADJUST LOCATION OF BYPASS PIPE AS NEEDED TO PERFORM WORK. (3/6)
5. CAPTURE AND REMOVE ALL FISH BETWEEN THE FISH SCREENS IN ACCORDANCE WITH THE HPA. FISH CAPTURE SHALL BE PERFORMED UNDER THE SUPERVISION OF AN EXPERIENCED FISHERY BIOLOGIST.
6. INSTALL PRIMARY PUMP AND BACKUP PUMP. PUMPS SHALL BE SIZED PER THE PROJECT SPECIFICATIONS. (3/6)
7. INSTALL GRAVEL BAG BERM. (3/6)
8. TURBIDITY MONITORING STATION. DOWNSTREAM MONITORING STATION SHALL BE INSTALLED 100 FEET DOWNSTREAM OF THE CONSTRUCTION AREA FOR TYPICAL FLOWS DURING THE WORK WINDOW. SEE CONTRACT SPECIFICATIONS FOR MONITORING REQUIREMENTS.
9. INSTALL FILTER BAG FOR SEDIMENT REMOVAL FROM ANY DEWATERING ACTIVITIES THAT MAY BE NECESSARY DURING CONSTRUCTION. (4/6)

MATCHLINE SEE BELOW

SEE SHEET 5 FOR FULL EXTENT OF STABILIZED CONSTRUCTION ENTRANCE

MATCHLINE SEE SHEET 5

MATCHLINE SEE ABOVE

LEGEND

- HVF — HIGH VISIBILITY FENCE
- FM — FORCE MAIN
- FISH SCREEN
- PROJECT LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- TEMPORARY RIPRAP MAT
- SEDIMENT MAT
- INLET PROTECTION
- P — PUMP
- M — TURBIDITY MONITORING STATION
- GRAVEL BAG
- REMOVE TREE
- PROTECT TREE

(##)

EROSION CONTROL NOTES:

1. MARK PROJECT LIMITS IN ACCORDANCE WITH BMP C103 AS SHOWN ON PLANS: HIGH VISIBILITY PLASTIC FENCE, CLEAR AND GRUB, AS NEEDED, WITHIN PROJECT LIMITS.
2. INSTALL BMP C220: STORM DRAIN INLET PROTECTION.
3. EXISTING TREE SHALL BE PROTECTED.
4. EXISTING TREE SHALL BE REMOVED.
5. STABILIZED CONSTRUCTION ENTRANCE PER BMP C105.

811 Know what's below. Call before you dig.

SCALE: 1" = 10'
0 10 20 30

MARELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_TESC.DWG
PLOT TIME: 1/28/2019 12:31 PM
USER NAME:ALEKSANDRA SLATALA

DESIGNED BY	IMF
DRAWN BY	AKS
CHECKED BY	TJO

OSBORN CONSULTING INCORPORATED

OSBORN CONSULTING, INC.
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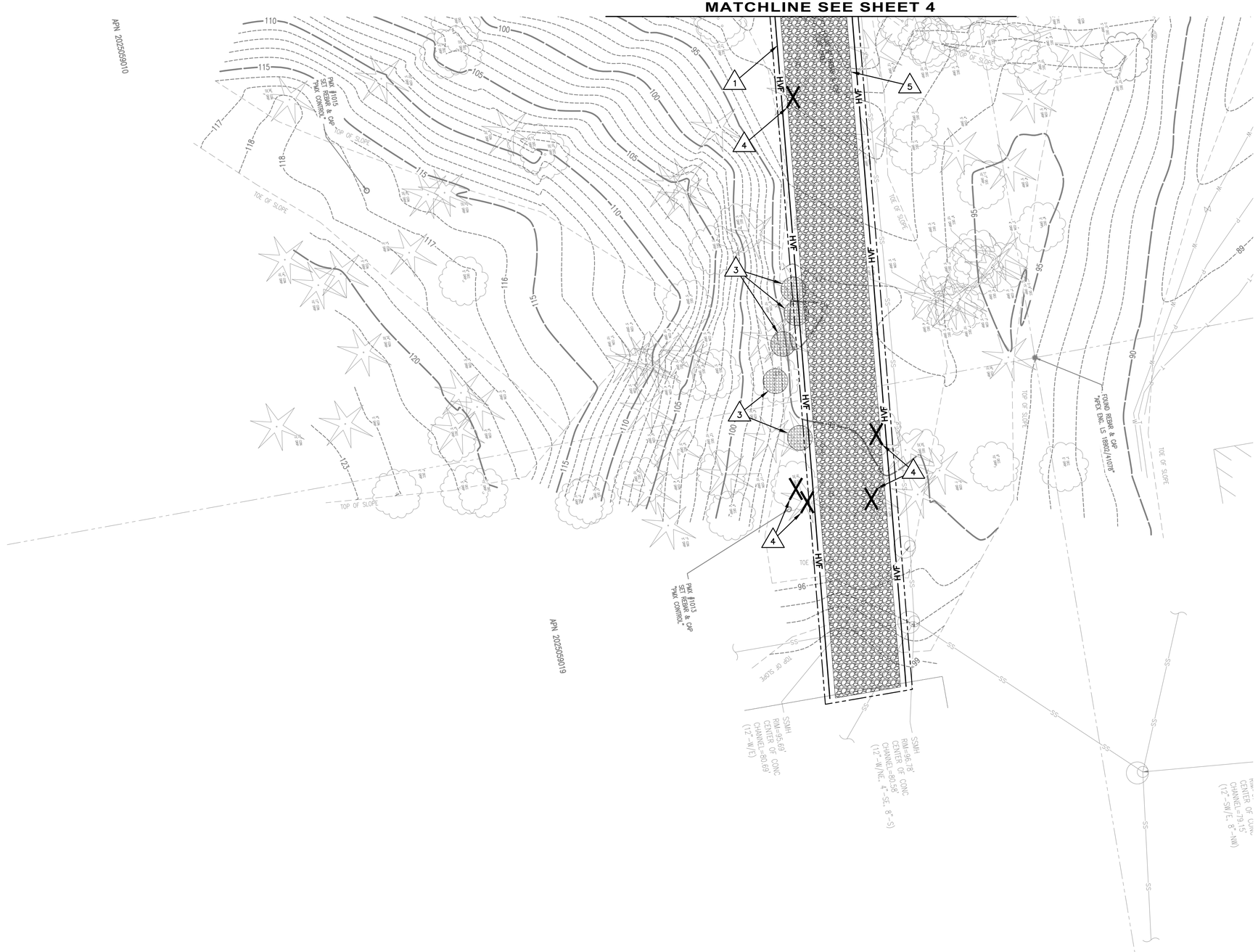
NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
EROSION CONTROL AND STREAM BYPASS PLAN

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE: H: 1"=10' V: N/A	SHEET: 4 of 14

SEC. 20, T. 25 N., R. 5 E., W.M.



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LEGEND

- HVF — HIGH VISIBILITY FENCE
- FM — FORCE MAIN
- FISH SCREEN
- PROJECT LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- TEMPORARY RIPRAP MAT
- SEDIMENT MAT
- INLET PROTECTION
- P — PUMP
- M — TURBIDITY MONITORING STATION
- GRAVEL BAG
- X — REMOVE TREE
- PROTECT TREE

EROSION CONTROL NOTES:

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3. EXISTING TREE SHALL BE PROTECTED.
4. EXISTING TREE SHALL BE REMOVED.
5. STABILIZED CONSTRUCTION ENTRANCE PER BMP C105.

811 Know what's below. Call before you dig.

SCALE: 1" = 10'
0 10 20 30

DARRELL OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.	
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CHECKED BY TJO		Bellevue, WA. 98004 Fax (888) 391-8517	

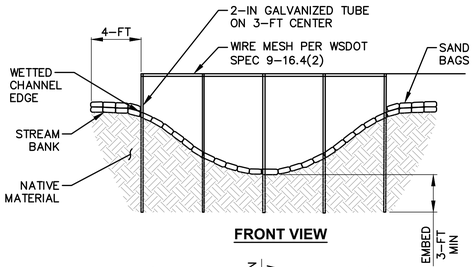
NO.	DATE	REVISION	BY

City of Bellevue

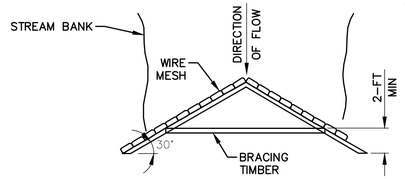
YARROW CREEK
CITY OF BELLEVUE
EROSION CONTROL AND STREAM BYPASS PLAN

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: 1"=10' V: N/A	SHEET 5 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_TESC.DWG
PLOT TIME: 1/28/2019 12:31 PM
USER NAME:ALEKSANDRA SLATALA



FRONT VIEW



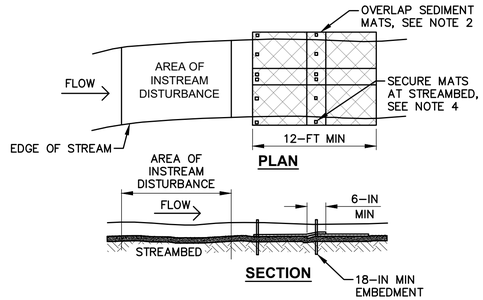
PLAN VIEW

CONSTRUCTION SEQUENCE

1. INSTALL 2–IN GALVANIZED TUBES ON 3–FT CENTERS.
2. SECURE WIRE MESH TO 2–IN GALVANIZED TUBES WITH WIRE FASTENER.
3. SECURE 1/4–IN MAX. FISH NYLON NET TO UPSTREAM SIDE OF WIRE MESH WITH WIRE FASTENER.
4. SECURE NYLON FISH NET TO STREAM BOTTOM WITH SAND BAGS.
5. EXTEND SAND BAGS 4–FT MIN. INTO STREAM BANKS.
6. ADD BRACING TIMBER AS NEEDED TO SUPPORT THE SCREEN
7. REMOVAL OF DEBRIS FROM THE UPSTREAM SIDE OF THE FENCE IS NECESSARY OTHERWISE THE SCREEN WILL BECOME CLOGGED AND WATER MAY TOPPLE OR BREACH THE SCREEN.

1/4 FISH SCREEN DETAIL

N.T.S.



PLAN

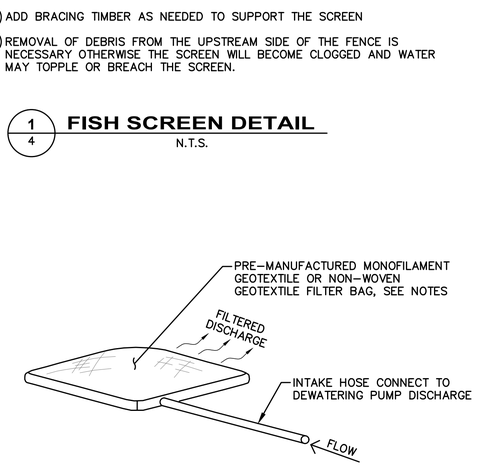
SECTION

NOTES:

1. INSTALL MATS FLAT ON THE STREAM BOTTOM AT DOWNSTREAM EDGE OF DISTURBED AREA IMMEDIATELY PRIOR TO INSTREAM DISTURBANCE AND REMOVE IMMEDIATELY AFTER INSTREAM ACTIVITIES ARE COMPLETED.
2. OVERLAP THE TRAILING EDGE OF UPSTEAM MATS OVER THE LEADING EDGE OF DOWNSTREAM MATS BY AT LEAST 6–IN. OVERLAP SIDES A MINIMUM OF 6–IN.
3. HOLD THE LEADING EDGE OF THE MATS TIGHTLY TO STREAMBED CONTOURS WITH ROCKS OR OTHER WEIGHTS.
4. SECURE UPSTREAM CORNERS AND CENTERS OF MATS IN THE STREAMBED WITH 2–IN X 2–IN X 2–FT LONG WOOD STAKES.
5. IF STREAM VELOCITY IS HIGH, ENGINEER MAY REQUIRE ADDITIONAL LENGTH OF SEDIMENT MAT.

2/4 SEDIMENT MAT DETAIL

N.T.S.

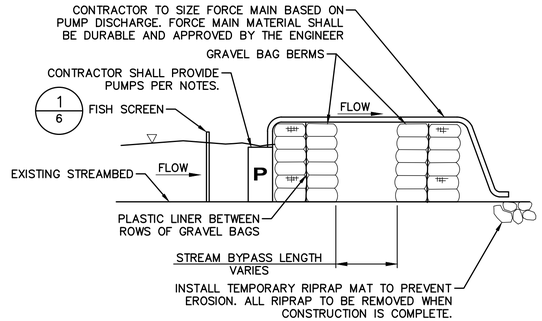


NOTES:

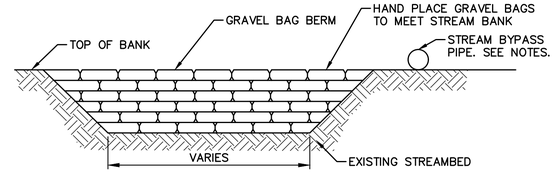
1. FILTER BAG SHALL BE MINIMUM 10–FT X 15–FT AND REPLACED AS NEEDED TO ACCOMMODATE ACTUAL SEDIMENT LOAD CONDITIONS (I.E. VOLUME, TYPE OF SEDIMENT, ETC.)
2. DRAIN FILTER BAG TO APPROVED (GRASSY, UPLAND OF OHWM) RECEIVING AREA, MONITOR SYSTEM FREQUENTLY TO VERIFY ADEQUATE PERFORMANCE AND CONDITION OF FACILITIES.

4/4 DEWATERING FILTER BAG DETAIL

N.T.S.



SIDE VIEW



FRONT VIEW

NOTES:

1. TYPICAL 2–YEAR STORM EVENT IS 12.5 CFS.
2. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY PUMP CAPACITY IS ADEQUATE FOR FLOWS DURING CONSTRUCTION.
3. CONTRACTOR SHALL HAVE ON SITE, EMERGENCY BYPASS PIPE, PUMPS, GENERATOR, AND APPURTENANCES IN THE EVENT OF HIGH FLOWS. EMERGENCY BYPASS PUMP INTAKE SHALL BE SCREENED TO PREVENT FISH FROM ENTERING BYPASS SYSTEM.

3/4 TEMPORARY STREAM BYPASS DETAIL

N.T.S.

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TARELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.	
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CHECKED BY TJO		Bellevue, WA. 98004 Fax (888) 391–8517	

NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
EROSION CONTROL AND STREAM BYPASS DETAILS

JOB# / DWG	DATE
10–150071_T02	2/15/19
SCALE H: N/A V: N/A	SHEET 6 of 14

STANDARD NOTES FOR EROSION CONTROL PLANS

1. ALL CLEARING & GRADING CONSTRUCTION MUST BE IN ACCORDANCE WITH CITY OF BELLEVUE (COB) CLEARING & GRADING CODE, CLEARING & GRADING DEVELOPMENT STANDARDS, LAND USE CODE, UNIFORM BUILDING CODE, PERMIT CONDITIONS, AND ALL OTHER APPLICABLE CODES, ORDINANCES, AND STANDARDS. THE DESIGN ELEMENTS WITHIN THESE PLANS HAVE BEEN REVIEWED ACCORDING TO THESE REQUIREMENTS. ANY VARIANCE FROM ADOPTED EROSION CONTROL STANDARDS IS NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY THE CITY OF BELLEVUE DEVELOPMENT SERVICES (DSD) PRIOR TO CONSTRUCTION.

   IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CORRECT ANY ERROR, OMISSION, OR VARIATION FROM THE ABOVE REQUIREMENTS FOUND IN THESE PLANS. ALL CORRECTIONS SHALL BE AT NO ADDITIONAL COST OR LIABILITY TO THE COB.

2. APPROVAL OF THIS EROSION/SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).

3. A COPY OF THE APPROVED PLANS AND DRAWINGS MUST BE ON-SITE DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY OTHER REQUIRED OR RELATED PERMITS PRIOR TO BEGINNING CONSTRUCTION.

4. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.

5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.

6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.

7. ALL LOCATIONS OF EXISTING UTILITIES HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD, THEREFORE, BE CONSIDERED ONLY APPROXIMATE AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS AND TO DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.

8. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.

9. CLEARING SHALL BE LIMITED TO THE AREAS WITHIN THE APPROVED DISTURBANCE LIMITS. EXPOSED SOILS MUST BE COVERED AT THE END OF EACH WORKING DAY WHEN WORKING FROM OCTOBER 1ST THROUGH APRIL 30TH. FROM MAY 1ST THROUGH SEPTEMBER 30TH, EXPOSED SOILS MUST BE COVERED AT THE END OF EACH CONSTRUCTION WEEK AND ALSO AT THE THREAT OF RAIN.

10. AT NO TIME SHALL MORE THAN ONE FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.

11. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT.

12. THE CONTRACTOR MUST MAINTAIN A SWEEPER ON SITE DURING EARTHWORK AND IMMEDIATELY REMOVE SOIL THAT HAS BEEN TRACKED ONTO PAVED AREAS AS RESULT OF CONSTRUCTION.

13. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.

14. ANY EXCAVATED MATERIAL REMOVED FROM THE CONSTRUCTION SITE AND DEPOSITED ON PROPERTY WITHIN THE CITY LIMITS MUST BE DONE IN COMPLIANCE WITH A VALID CLEARING & GRADING PERMIT. LOCATIONS FOR THE MOBILIZATION AREA AND STOCKPILED MATERIAL MUST BE APPROVED BY THE INSPECTOR AT LEAST 24 HOURS IN ADVANCE OF ANY STOCKPILING.

15. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.

16. FINAL SITE GRADING MUST DIRECT DRAINAGE AWAY FROM ALL BUILDING STRUCTURES AT A MINIMUM 5% SLOPE, PER THE INTERNATIONAL RESIDENTIAL CODE (IRC) R401.3.

17. ACTIVITIES SHALL BE DESIGNED AND CONSTRUCTED TO AVOID AND MINIMIZE ADVERSE IMPACTS TO WATERS OF THE UNITED STATES TO THE MAXIMUM EXTENT PRACTICAL THROUGH USE OF PRACTICAL ALTERNATIVES. ALTERNATIVES THAT SHALL BE CONSIDERED INCLUDE THOSE THAT MINIMIZE THE NUMBER AND EXTENT OF IN-WATER WORK AND EQUIPMENT CROSSINGS OF WETTED CHANNELS.

18. AT NO TIME SHALL SEDIMENT-LADEN WATER BE DISCHARGED OR PUMPED DIRECTLY INTO THE SUBJECT STREAM. WATER SHALL BE DISCHARGED IN ACCORDANCE WITH REQUIREMENTS SET FORTH IN THE PROJECT PERMITS AND/OR SPECIFICATIONS.

19. IF HIGH WATER LEVEL CONDITIONS THAT CAUSE SILTATION OR EROSION ARE ENCOUNTERED DURING CONSTRUCTION, WORK SHALL STOP UNTIL THE WATER LEVEL SUBSIDES.

20. PERMIT CONDITIONS CONTAIN SPECIFIC REQUIREMENTS FOR THE CONTROL OF EROSION AND TURBIDITY FROM PROJECT OPERATIONS. TURBIDITY SHALL BE MONITORED ON A FREQUENT BASIS BY THE PROJECT MANAGEMENT AND INSPECTION STAFF ON-SITE. TURBIDITY AMOUNTS IN EXCESS OF THE PERMITTED CONCENTRATIONS AND/OR DURATIONS WILL CAUSE WORK TO BE STOPPED UNTIL IMPROVED PRACTICES ARE IN EFFECT AND THE PROBLEMS ARE CONTROLLED. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR ANY PROJECT DELAYS THAT OCCUR BY NATURE OF THIS FAILURE TO ADEQUATELY CONTAIN SEDIMENT ON-SITE.

21. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO CONSTRUCTION AREAS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY THE ENGINEER OR OWNER.

22. ALL EXTERNAL GREASE AND OIL SHALL BE PRESSURE-WASHED OFF THE EQUIPMENT PRIOR TO TRANSPORT TO THE SITE.

23. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT-LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE SURFACE WATERS.

24. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ON-SITE AT ALL TIMES.

25. CONTRACTOR SHALL BE RESPONSIBLE TO KEEP STREETS AND PAVED PARKING AREAS FREE FROM SEDIMENTATION.

26. NO TREES OR VEGETATION SHALL BE REMOVED UNLESS THEY ARE SHOWN AND NOTED TO BE REMOVED ON THE PLANS OR AS DIRECTLY SPECIFIED ON-SITE BY THE ENGINEER. ALL TREES CONFLICTING WITH GRADING SHALL BE REMOVED. NO GRADING SHALL TAKE PLACE WITHIN THE DRIP LINE OF TREES NOT TO BE REMOVED UNLESS OTHERWISE APPROVED.

27. SILT FENCE AND HIGH VISIBILITY FENCE LOCATIONS ARE APPROXIMATE AND MAY BE FIELD LOCATED BY THE ENGINEER.

28. ALL TEMPORARY EROSION CONTROL STRUCTURES SHALL BE MAINTAINED IN SATISFACTORY CONDITION UNTIL CLEARING AND/OR CONSTRUCTION IS COMPLETED AND SURFACE RESTORATION HAS BEEN COMPLETED.

29. FOLLOWING CONSTRUCTION, SITE RESTORATION WILL INCLUDE ESTABLISHING LONG-TERM EROSION PROTECTION MEASURES. THESE MEASURES WILL INCLUDE PLANTINGS, EROSION CONTROL FABRIC, SEED, AND MULCH. EQUIPMENT AND EXCESS SUPPLIES WILL BE REMOVED AND THE WORK AREA WILL BE CLEANED. MAINTENANCE ACTIVITIES FOR THE NEWLY CONSTRUCTED RESTORATION PROJECTS ARE ANTICIPATED TO OCCUR PERIODICALLY.

30. ALL BEST MANAGEMENT PRACTICES (BMPS) SHALL BE INSTALLED IN ACCORDANCE WITH THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON (2012).

31. ALL WORK WITHIN THE STREAM SHALL MEET THE AQUATIC INVASIVE SPECIES CONTROL REQUIREMENTS AS SPECIFIED IN SECTION 8-15 OF THE PROJECT SPECIFICATIONS.

811 Know what's below. Call before you dig.

TARELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF
DRAWN BY AKS
CHECKED BY TJO

OSBORN CONSULTING INCORPORATED

OSBORN CONSULTING, INC.
1800 112th Ave. NE, Suite 220E Ph (425) 451-4009
Bellevue, WA. 98004 Fax (888) 391-8517

NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
EROSION CONTROL NOTES

JOB# / DWG: 10-150071_T02
DATE: 2/15/19
SCALE: H: N/A V: N/A
SHEET: 7 of 14

SEC. 20 , T. 25 N., R. 5 E., W.M.

STAGING NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL MACHINERY AND TOOLS.
2. CONTRACTOR SHALL MAINTAIN PARKING ACCESS.
3. PRIVATE DRIVEWAYS TO REMAIN ACTIVE. CONTRACTOR SHALL CONTACT CITY CONSTRUCTION INSPECTOR AT LEAST 72 HOURS IN ADVANCE IF TEMPORARY CLOSURE IS REQUIRED.

LEGEND:

TEMPORARY EASEMENT

STABILIZED CONSTRUCTION ENTRANCE

TEMPORARY CONSTRUCTION EASEMENT POINT

TEMPORARY CONSTRUCTION EASEMENT POINT TABLE

POINT #	NORTHING	EASTING
1	235577.4659	1304159.5466
2	235627.6187	1304202.9929
3	235592.5011	1304243.4158
4	235585.9366	1304259.1781
5	235585.4454	1304288.8650
6	235569.9774	1304288.7106
7	235562.6966	1304360.1066
8	235470.5959	1304349.5004
9	235453.5802	1304476.7834
10	235452.6901	1304504.9891
11	235358.8761	1304501.9607
12	235358.4353	1304474.4424
13	235411.4269	1304475.7462
14	235426.5492	1304344.4281
15	235285.3523	1304328.1682
16	235288.1776	1304242.4180
17	235473.4296	1304240.7916

811
Know what's below.
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SCALE: 1" = 50'
0 50 100 150

MARELLE OSBORN
STATE OF WASHINGTON
41694
REGISTERED
PROFESSIONAL ENGINEER

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_PP.DWG
PLOT TIME: 1/28/2019 12:32 PM
USER NAME:ALEKSANDRA SLATALA

DESIGNED BY	IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.
DRAWN BY	AKS		1800 112th Ave. NE, Suite 220E Ph (425) 451-4009
CHECKED BY	TJO		Bellevue, WA. 98004 Fax (888) 391-8517

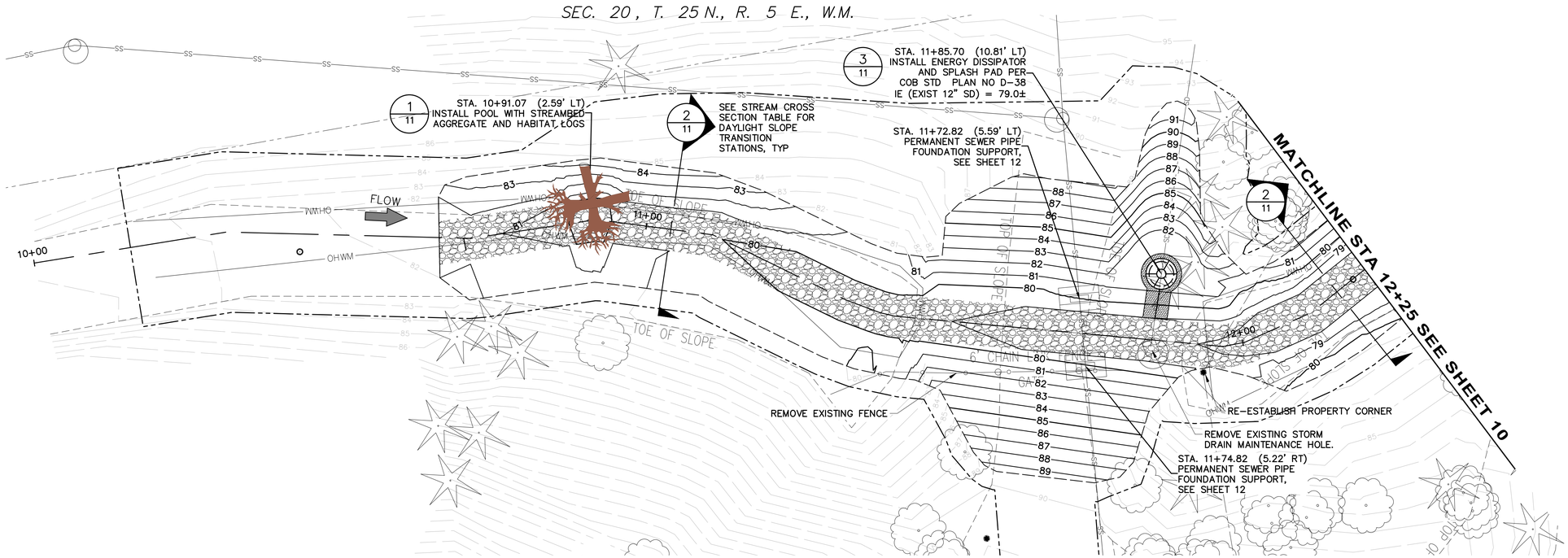
NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
TEMPORARY CONSTRUCTION EASEMENT PLAN

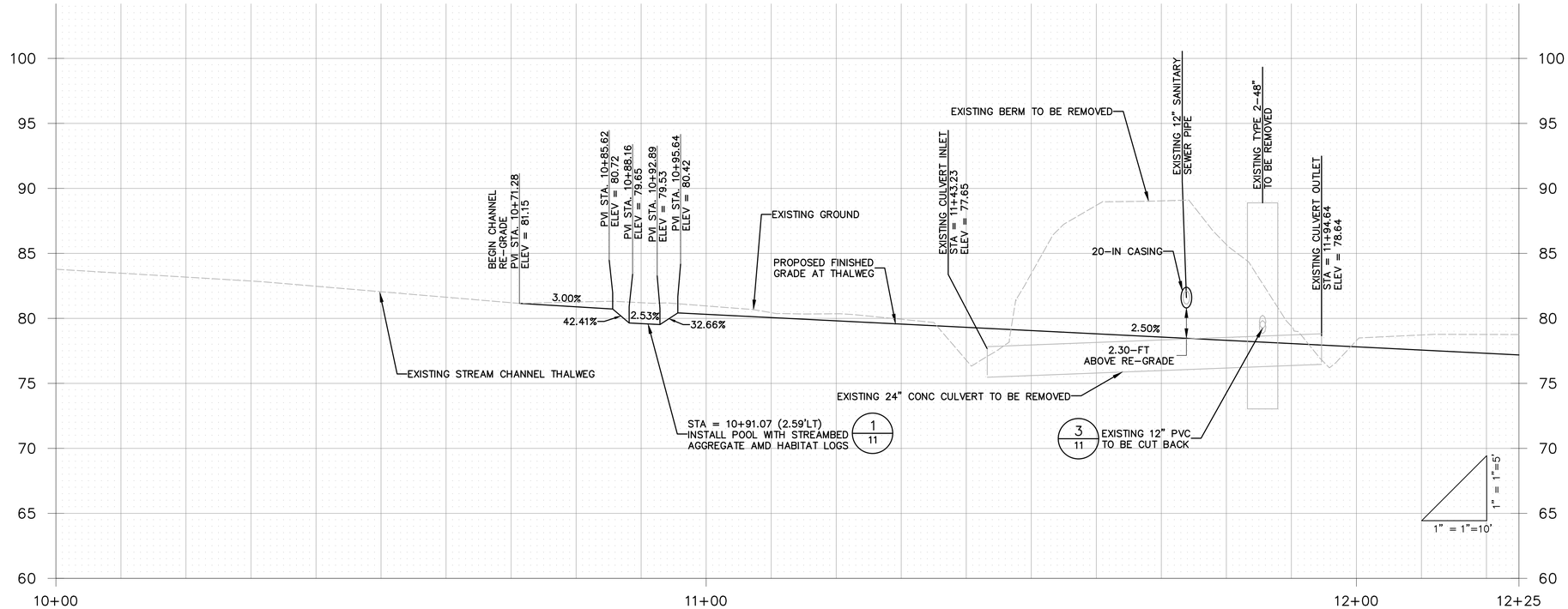
JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: 1"=50' V: N/A	SHEET 8 of 14

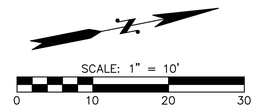
SEC. 20, T. 25 N., R. 5 E., W.M.



LEGEND

- 5 — MAJOR CONTOUR
- 1 — MINOR CONTOUR
- 5 — MAJOR EXISTING CONTOUR
- 1 — MINOR EXISTING CONTOUR
- GRADING LIMITS
- PROJECT LIMITS
- STREAMBED AGGREGATE
- SEWER PIPE FOUNDATION
- HABITAT LOGS





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HAROLD E. OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY IMF / DRAWN BY AKS / CHECKED BY TJO	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC. 1800 112th Ave. NE, Suite 220E Ph (425) 451-4009 Bellevue, WA. 98004 Fax (888) 391-8517	NO.	DATE	REVISION	BY	City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
PLAN AND PROFILE

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: 1"=10' V: 1"=5'	SHEET 9 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_PP.DWG
PLOT TIME: 1/28/2019 12:32 PM
USER NAME:ALEKSANDRA SLATALA

SEC. 20 , T. 25 N., R. 5 E., W.M.

MATCHLINE STA 12+25 SEE SHEET 9

SEE STREAM CROSS SECTION TABLE FOR DAYLIGHT SLOPE TRANSITION STATIONS, TYP

2 / 11

FLOW

STA. 12+44.44 (1.38' RT) INSTALL POOL WITH STREAMBED AGGREGATE AND HABITAT LOGS

1 / 11

13+00

14+00

14+40

TOP OF SLOPE

TOE OF SLOPE

ASPH

CB RIM=78.67' E 12" CONC (NE)=75.13 E 12" CONC (NW)=75.67 E 6" PVC (E)=75.67 BOTTOM=73.92'

PVI #10 SET HUB & MAG NAIL

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- MAJOR EXISTING CONTOUR
- MINOR EXISTING CONTOUR
- GRADING LIMITS
- PROJECT LIMITS
- STREAMBED AGGREGATE
- SEWER PIPE FOUNDATION
- HABITAT LOGS

SCALE: 1" = 10'

0 10 20 30

105 100 95 90 85 80 75 70 65 60

12+25 13+00 14+00 14+50

PROPOSED FINISHED GRADE AT CENTERLINE

EXISTING STREAM CHANNEL THALWEG

EXISTING GROUND

PVI STA. 12+39.39 ELEV = 76.83

PVI STA. 12+41.74 ELEV = 75.85

PVI STA. 12+50.70 ELEV = 75.78

PVI STA. 12+52.84 ELEV = 76.56

PVI STA. 12+99.79 ELEV = 75.81

END CHANNEL RE-GRADE PVI STA. 13+33.30 ELEV = 75.48

41.70% 0.73% 36.33% 1.59% 1.00%

STA = 12+44.44 (1.38'RT) INSTALL POOL WITH STREAMBED AGGREGATE AND HABITAT LOGS

1 / 11

1" = 1"=10'

1" = 1"=5'

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YARRELL OSBORN STATE OF WASHINGTON 41894 REGISTERED PROFESSIONAL ENGINEER

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_PP.DWG
PLOT TIME: 1/28/2019 12:32 PM
USER NAME:ALEKSANDRA SLATALA

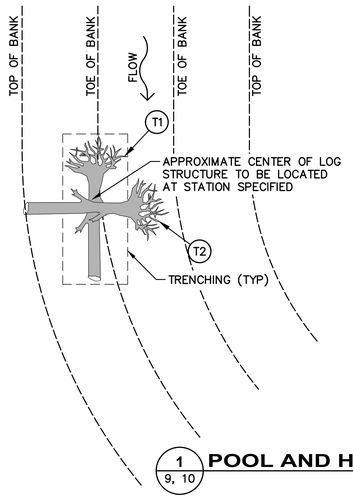
DESIGNED BY	IMF	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC.
DRAWN BY	AKS		1800 112th Ave. NE, Suite 220E Ph (425) 451-4009
CHECKED BY	TJO		Bellevue, WA. 98004 Fax (888) 391-8517

NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
PLAN AND PROFILE

JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: 1"=10' V: 1"=5'	SHEET 10 of 14



NOTES:

DOUBLE LOG STRUCTURE:

1. EXCAVATE TRENCHES FOR LOG T1 AS SHOWN. PLACEMENT TO BE FIELD VERIFIED BY ENGINEER.
2. PLACE LOG T1 NEARLY PARALLEL TO BANK. THE TOP OF LOG T1 SHOULD BE NO MORE THAN 12 INCHES ABOVE THE FINISHED GRADE OF THE STREAMBED. THE CENTER OF LOG T1 SHOULD BE LOCATED AT THE STATION SPECIFIED ON THE PLAN AND PROFILE SHEETS (SHEETS 9 AND 10). THE ROOTWAD SHOULD BE POINTING UPSTREAM AS SHOWN.
3. CUT NOTCHES IN LOGS T1 AND T2 WHERE LOGS WILL BE TIED TOGETHER. PLACE LOG T2 OVER LOG T1 AS SHOWN. EMBED LOG T1 BY PRESSING LOG INTO THE SOIL. THE EMBEDDED END OF LOG T2 SHOULD BE DIRECTED DOWNWARD. LOG T2 SHOULD HAVE AT LEAST 4 FEET OF SOIL COVER OVER THE TOP OF THE EMBEDDED PORTION OF THE LOG.
4. INSTALL CHAIN TO TIE LOGS T1 AND T2 TOGETHER.
5. INSTALL SOIL ANCHORS ACCORDING TO MANUFACTURERS SPECIFICATIONS.
6. BACKFILL AROUND LOG WITH STREAMBED AGGREGATE.

1 / 9, 10 POOL AND HABITAT LOGS DETAIL

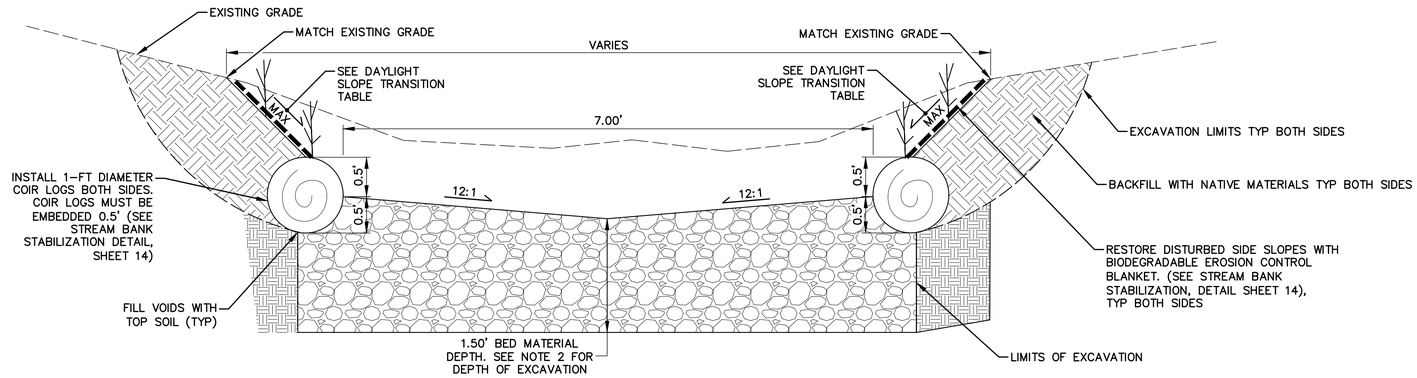
N.T.S.

STREAMBED AGGREGATE GRADATION	
SIEVE SIZE	**PERCENT PASSING BY WEIGHT**
10" SQUARE	99–100
4" SQUARE	75–90
2" SQUARE	50–70
1–1/2" SQUARE	40–60
5/8" SQUARE	15–30
NO. 4	10–20
NO. 40	10–16
NO. 200	5–10

NOTES:

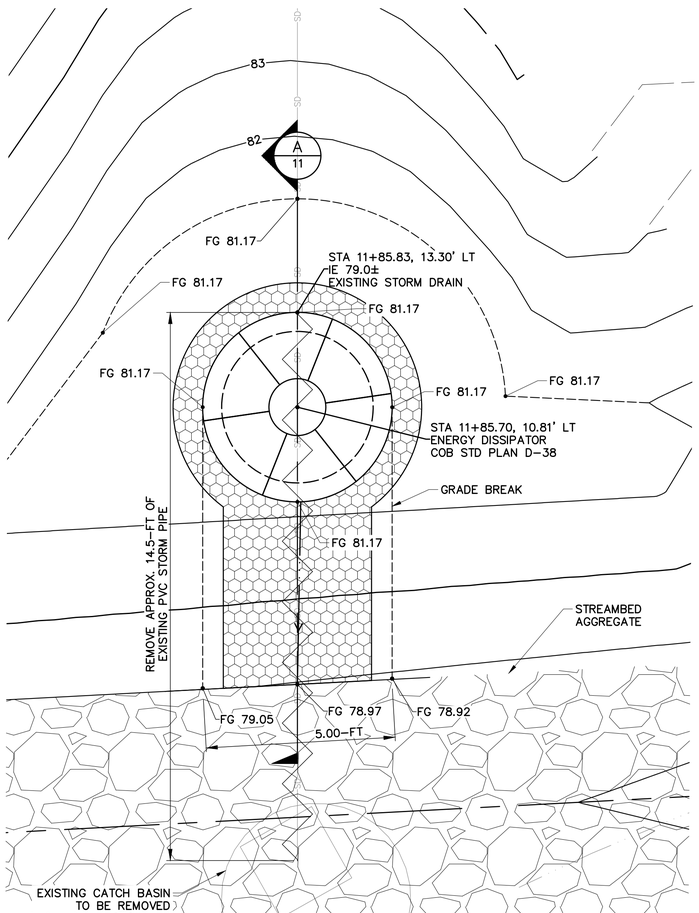
1. RESTORED STREAMBED SHALL BE CONSTRUCTED OF STREAMBED AGGREGATE. STREAMBED AGGREGATE SIZE WILL MEET REQUIREMENTS OF SPECIFICATION SECTION 8–17.
2. STREAMBED AGGREGATE DEPTH MAY BE ADJUSTED BY ENGINEER TO ACCOMMODATE FOR VARIABILITY OF MATERIAL.
3. ADDITIONAL STREAMBED AGGREGATE TO BE ADDED TO POOLS AND UNDER HABITAT LOGS AS SHOWN IN PLANS, MINIMUM 6" DEPTH.
4. DAYLIGHT SLOPES SHOWN ARE MAXIMUM. TRANSITION SLOPES NOT TO EXCEED 2:1 MAXIMUM.

DAYLIGHT SLOPE TRANSITION	
START/END SLOPE VALUE (SEE NOTE 4)	**STATION**
START 3:1 SLOPE	10+71.3
END 3:1 SLOPE	11+47.5
SLOPE TRANSITION	11+47.5 – 11+50.0
START 2:1 SLOPE	11+50.0
END 2:1 SLOPE	11+95.0
SLOPE TRANSITION	11+95.0 – 12+03.2
START 3:1 SLOPE	12+03.2
END 3:1 SLOPE	13+33.3



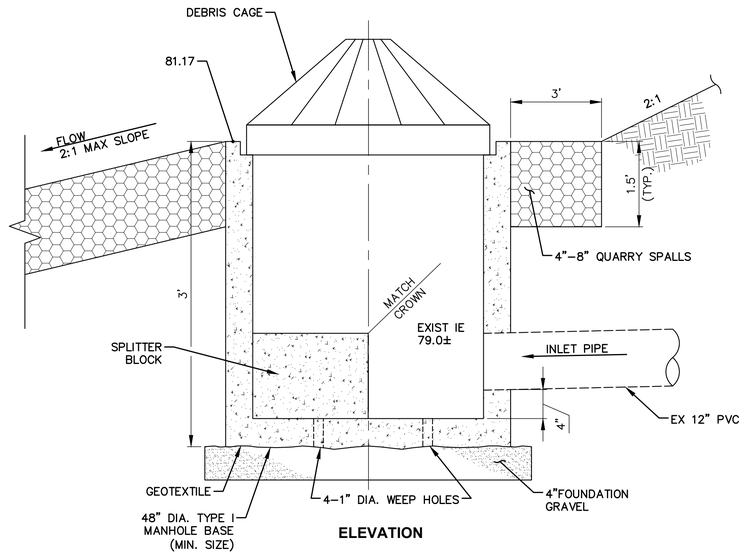
2 / 9 STREAM CROSS SECTION

N.T.S.

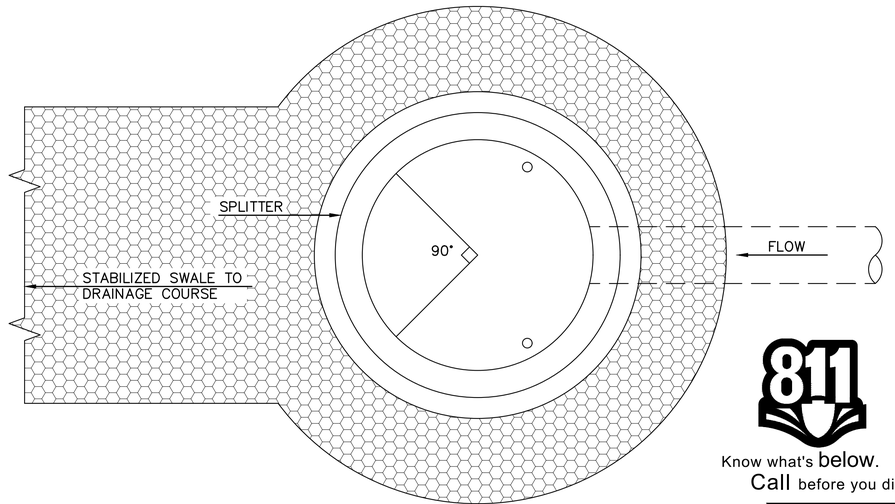


3 / 9 DISSIPATOR OUTFALL DETAIL

SCALE: 1" = 2'



ELEVATION



PLAN

A / 9 ENERGY DISSIPATOR

N.T.S.

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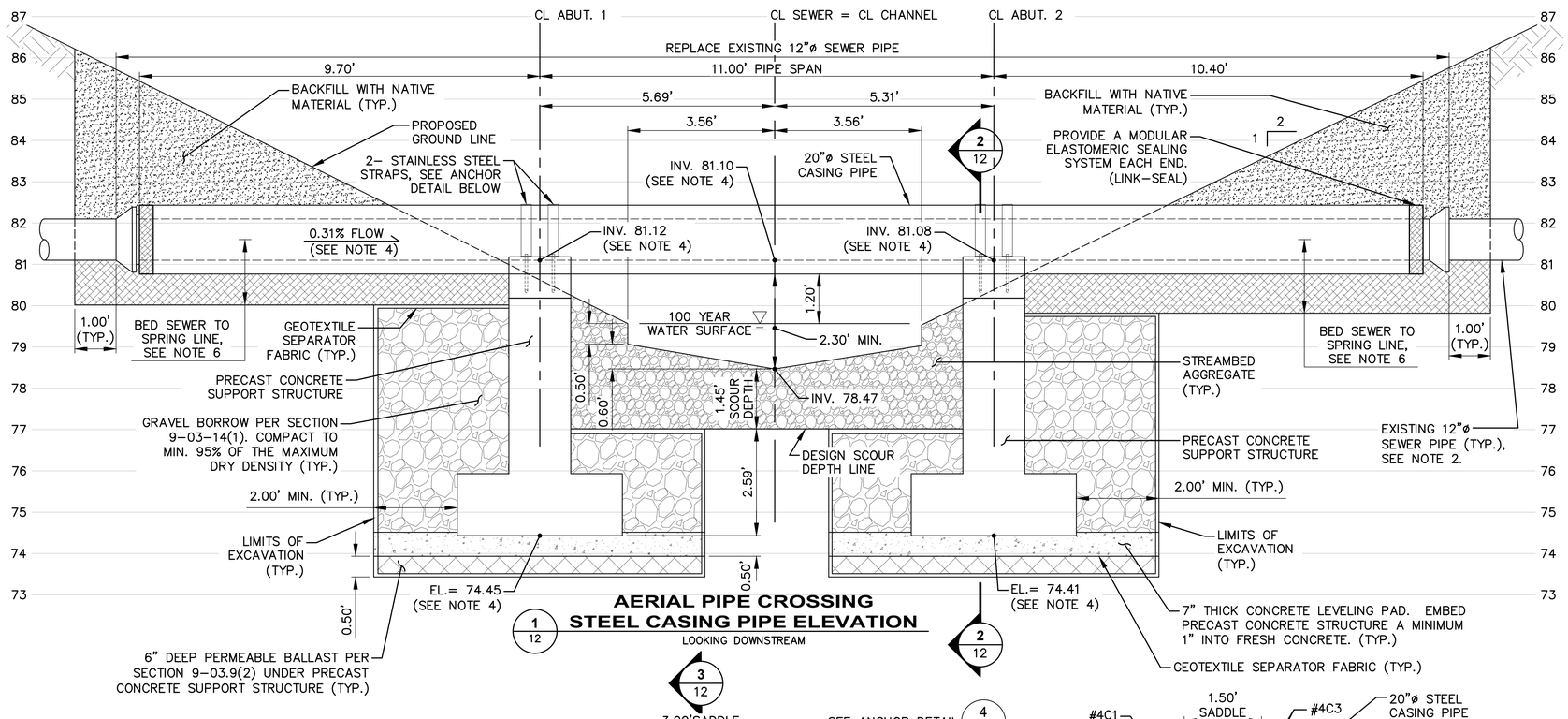
DRAWN BY AKS		1800 112th Ave. NE, Suite 220E Ph (425) 451–4009	**YARROW CREEK**
CHECKED BY TJO		Bellevue, WA. 98004 Fax (888) 391–8517	**CITY OF BELLEVUE**
		NO. DATE REVISION BY	**STREAM DETAILS**

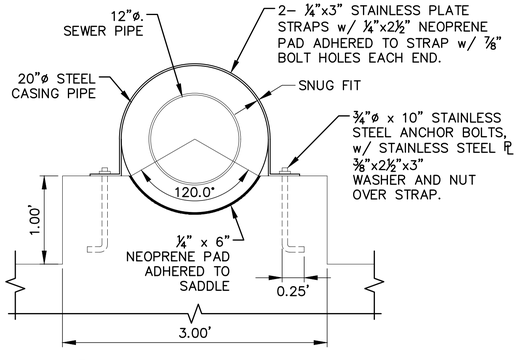
JOB# / DWG	DATE
10–150071_T02	2/15/19
SCALE H: N/A V: N/A	SHEET 11 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_DETL.DWG
PLOT TIME: 1/28/2019 12:33 PM
USER NAME:ALEKSANDRA SLATALA



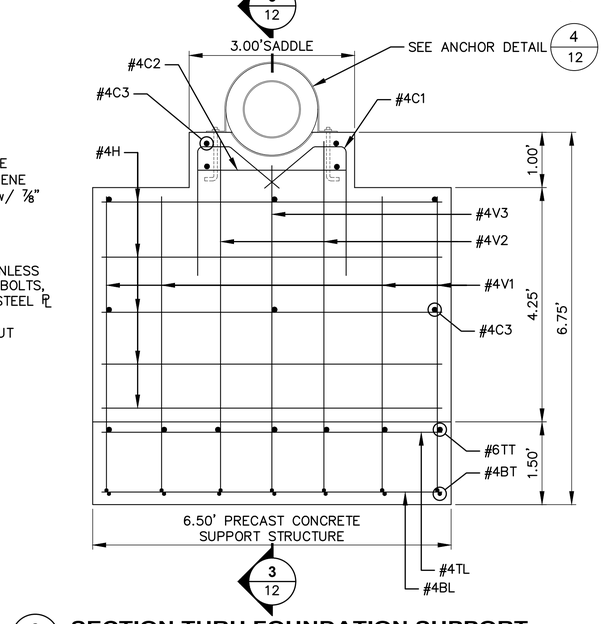
1/12 AERIAL PIPE CROSSING STEEL CASING PIPE ELEVATION

LOOKING DOWNSTREAM



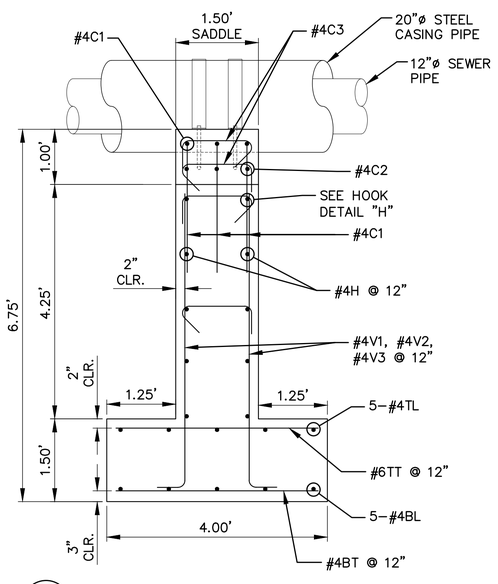
4/12 PIPE ANCHOR DETAIL

N.T.S.



2/12 SECTION THRU FOUNDATION SUPPORT

N.T.S.



3/12 REINFORCEMENT DETAILS

N.T.S.

TOTAL WEIGHT OF ONE PRECAST CONCRETE SUPPORT STRUCTURE = 12,760 LBS.

NOTES

1. CASING SHALL BE INSTALLED ACCORDING TO CITY OF BELLEVUE STANDARD DETAIL S-33.
2. EXISTING SEWER PIPE SHALL BE PROTECTED WITH A MINIMUM 3.00' OF COVER BEYOND THE STEEL CASING ENDS. SEWER PIPE COVER SHALL BE VERIFIED PRIOR TO FABRICATION.
3. ELEVATION VIEW 1/12 IS TAKEN ALONG EXISTING 12"ø SEWER LINE.
4. THE CONTRACTOR SHALL VERIFY INVERT ELEVATIONS, BOTTOM OF FOOTING ELEVATIONS AND SLOPE OF THE SEWER LINE AND ADJUST THE DESIGN ACCORDINGLY PRIOR TO FABRICATION OF THE PRECAST CONCRETE SUPPORT STRUCTURES.
5. BAR DETAILING SHALL BE IN ACCORDANCE WITH CHAPTER SIX OF THE CONCRETE REINFORCING STEEL INSTITUTE (CRSI) MANUAL OF STANDARD PRACTICE, 2009 EDITION. DIMENSIONS ARE OUT-TO-OUT OF BARS.
6. BED SEWER TO SPRING LINE WITH COMPACTED GRAVEL BACKFILL FOR PIPE ZONE BEDDING PER WSDOT SECTION 9-03.12(3).

DESIGN DATA

DESIGN IS IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2012.
CLASS 4000 CONCRETE: f_c' = 4000 PSI
GRADE 60 REINFORCING STEEL: f_y = 60,000 PSI
HORIZONTAL EARTH PRESSURE = 36 LBS./CU.FT. EQUIVALENT FLUID PRESSURE.
WEIGHT OF CONCRETE = 150 LBS./CU.FT.

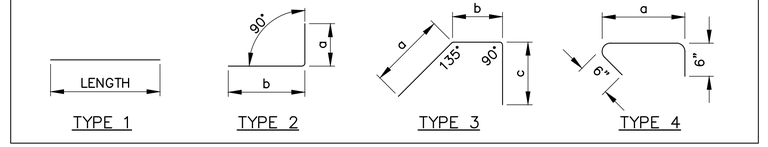
EXISTING SOIL:	PERMEABLE BALLAST:	BACKFILL:
MASS UNIT WEIGHT = 130 PCF	MASS UNIT WEIGHT = 130 PCF	MASS UNIT WEIGHT = 125 PCF
SAT. UNIT WEIGHT = 135 PCF	SAT. UNIT WEIGHT = 135 PCF	SAT. UNIT WEIGHT = 130 PCF
ELASTIC MODULUS = 600 KSF	ELASTIC MODULUS = 1000 KSF	ELASTIC MODULUS = 600 KSF
POISSON'S RATIO = 0.35	POISSON'S RATIO = 0.35	POISSON'S RATIO = 0.35
COHESION = 0 PSF	COHESION = 0 PSF	COHESION = 0 PSF
EFF. FRICTION ANGLE = 35°	EFF. FRICTION ANGLE = 38°	EFF. FRICTION ANGLE = 34°

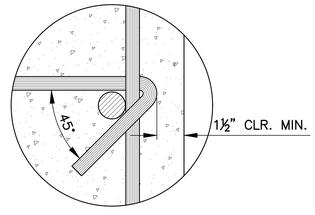
REINFORCEMENT SCHEDULE

QUANTITY IS FOR TWO PRECAST CONCRETE SUPPORT STRUCTURES

MARK	SIZE	TYPE	LENGTH	No. REQ'D	REMARKS
#4H	4	1	6'-2"	20	
#4V1	4	2	6'-0"	16	a=9"; b=5'-3"
#4V2	4	2	7'-0"	8	a=9"; b=6'-3"
#4V3	4	2	6'-6"	4	a=9"; b=5'-10"
#6TT	6	1	3'-8"	14	
#4BT	4	1	3'-8"	14	
#4TL	4	1	6'-2"	10	
#4BL	4	1	6'-2"	10	
#4C1	4	3	4'-1"	12	a=1'-2"; b=7"; c=2'-4"
#4C2	4	1	2'-8"	6	
#4C3	4	4	2'-3"	20	a=1'-3"
TOTAL REBAR WEIGHT: 470 LBS.					

BAR BENDING DIAGRAM





DETAIL "H"

N.T.S.

811 Know what's below. Call before you dig.

CONCEPTUAL DESIGN

DESIGNED BY	DRAWN BY	CHECKED BY
SS	CS	RT

Louis Berger

NO.	DATE	REVISION	BY

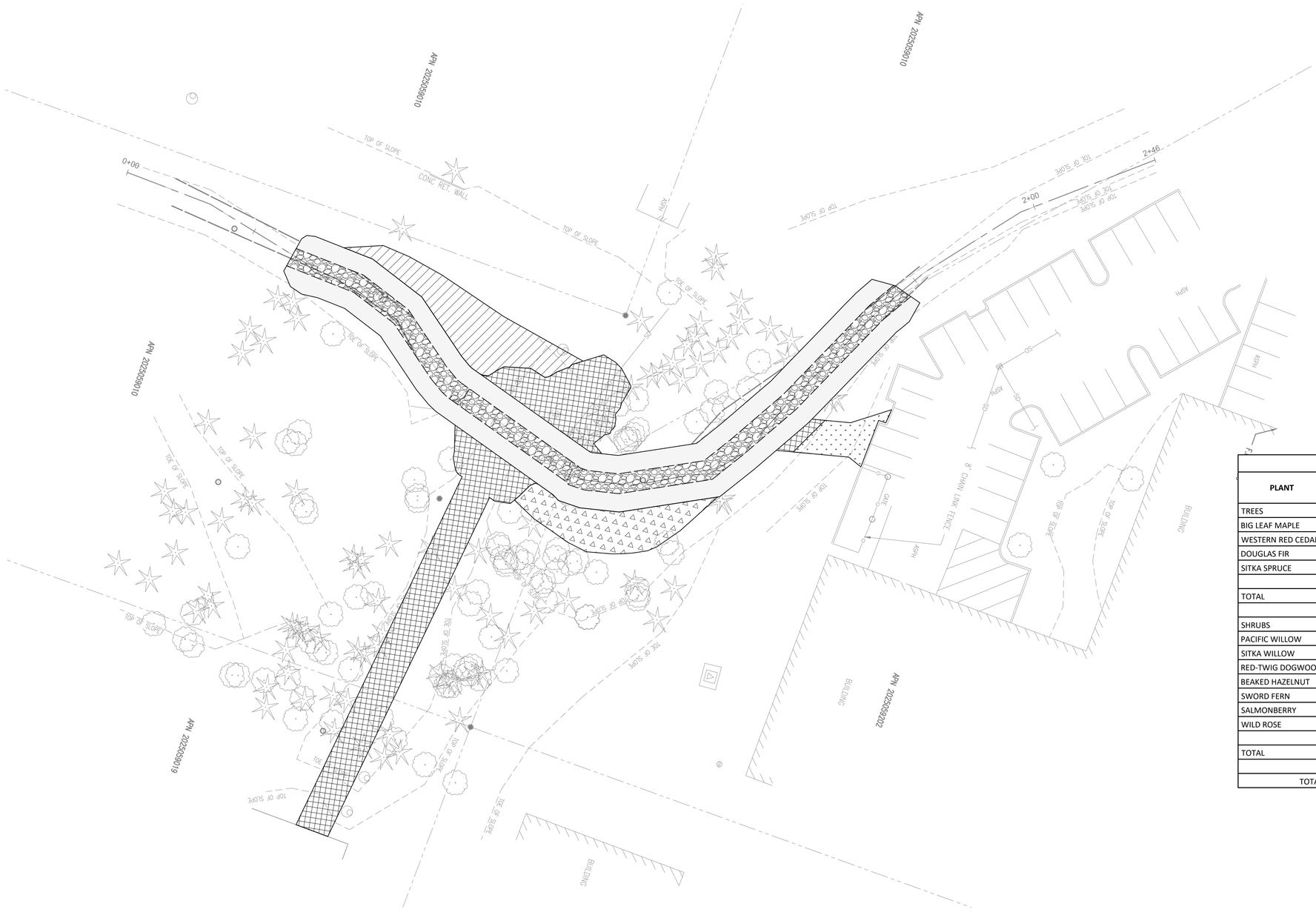
City of Bellevue

YARROW CREEK
10600 NE 29TH ST 98004
PIPE SUPPORT DETAILS

JOB# / DWG	DATE
10-150071_T02	1/23/19
SCALE H: N/A V: N/A	SHEET 12 of 14

FILE NAME: G:\CITYBELLEVUE\YARROW CREEK FISH PASSAGE\FR OSBORN CONSULTING\WORKING FILES\P_10-150071_DETL 7-17-18.DWG
PLOT TIME: 1/23/2019 11:33 AM
USER NAME:SANCHEZ, CALVIN

SEC. 20 , T. 25 N., R. 5 E., W.M.



LEGEND

- STREAM REGRADE AREA (3,515 SQ FT)
- STREAMBED AGGREGATE (1,910 SQ FT)
- LANDSCAPE AREA (310 SQ FT)
- PLANTING ZONE 1 (1,110 SQ FT)
- PLANTING ZONE 2 (850 SQ FT)
- PLANTING ZONE 3 (3,100 SQ FT)

NOTES:

1. NON-NATIVE BLACKBERRY SPECIES TO BE REMOVED BY HAND FROM RIPARIAN AREA.
2. IMPACTS TO VEGETATION IN CONSTRUCTION ACCESS AREA TO BE MINIMIZED TO THE EXTENT POSSIBLE. IMPACTED ACCESS AREAS TO BE RESTORED USING THE SAME METHODS AS STREAM BUFFER AREAS.
3. STREAM REGRADE AREA TO BE PLANTED WITH PACIFIC WILLOW LIVE STAKES (SEE STREAM BANK STABILIZATION DETAIL ON SHEET 14).

LANDSCAPING AREAS - HYDROSEED MIX			
SEED MIXTURE	% WEIGHT	MIN. % PURE SEED	MIN. % GERMINATION
PROTOCAL PERRENDIAL RYE	34.4	95	85
PARADIGM PERRENIAL RYE	34	95	85
BOREAL CREEPING RED FESCUE	29	95	85
WEED SEED	0.1 (MAX)		
INERT AND OTHER CROP	2.5 (MAX)		
TOTAL	100		
RATE 120 POUNDS SEED PER ACRE			

PLANTING MATERIAL LIST							
PLANT	SCIENTIFIC NAME	MINIMUM HEIGHT	SPACING	ZONE 1	ZONE 2	ZONE 3	STREAM REGRADE AREA
TREES							
BIG LEAF MAPLE	ACER MACROPHYLLUM	18"	9'	2	1	4	
WESTERN RED CEDAR	THUJA PLICATA	18"	9'	2		4	
DOUGLAS FIR	PSEUDO-TSUGA MENZIESII	18"	9'	1		4	
SITKA SPRUCE	PICEA SITCHENSIS	18"	9'	1	1	4	
TOTAL				6	2	16	
SHRUBS							
PACIFIC WILLOW	SALIX LUCIDA	36"	3'				366
SITKA WILLOW	SALIX SITCHENSIS	36"	4'		9	9	
RED-TWIG DOGWOOD	CORNUS SERICEA	12"	4'	20	9	9	
BEAKED HAZELNUT	CORYLUS CORNUTA	12"	4'	20	9	9	
SWORD FERN	POLYSTICHUM MUNITUM	12"	4'	20	9	10	
SALMONBERRY	RUBUS SPECTABILIS	12"	4'	20	9	10	
WILD ROSE	ROSA PISOCARPA	12"	4'		10		
TOTAL				80	55	47	366
TOTAL				86	57	63	366

811 Know what's below. Call before you dig.

SCALE: 1" = 20'
0 20 40 60

TANELLE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
IMF	AKS	TJO

OSBORN CONSULTING INCORPORATED

OSBORN CONSULTING, INC.
1800 112th Ave. NE, Suite 220E Ph (425) 451-4009
Bellevue, WA. 98004 Fax (888) 391-8517

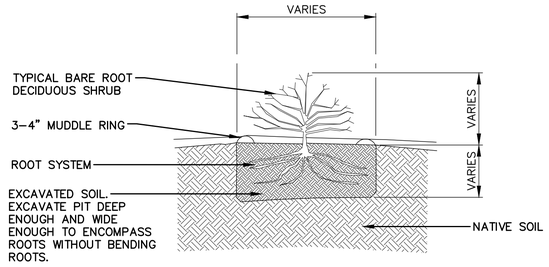
NO.	DATE	REVISION	BY

City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
PLANTING PLAN

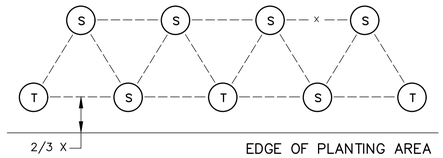
JOB# / DWG	DATE
10-150071_T02	2/15/19
SCALE H: 1"=20' V: N/A	SHEET 13 of 14

FILE NAME: P:\10-150071 BELLEVUE 2015 STORM ON-CALL (LOUIS BERGER)\T02_YARROWCREEKTRIB\3 CADD\SHEETS\P_10-150071_PLNT.DWG
PLOT TIME: 1/28/2019 12:34 PM
USER NAME:ALEKSANDRA SLATALA



BARE ROOT PLANTING DETAIL

N.T.S.



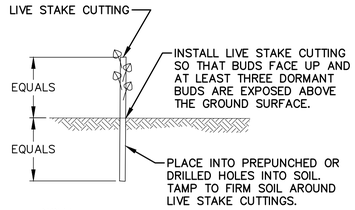
NOTE:
GROUP LIKE SHRUBS IN GROUPS OF 3 TO 5.
TREES SHOULD NOT BE PLACED NEXT TO EACH OTHER.

TYPICAL PLANT SPACING

X = PLANT SPACING (SEE PLANTING PLAN)

(S) = SHRUB

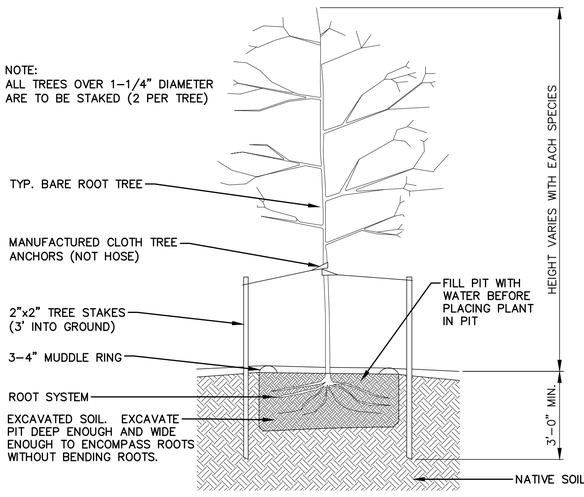
(T) = TREE



NOTE:
LIVE STAKE CUTTING SHALL BE A MINIMUM 36 INCHES IN LENGTH. LIVE STAKES SHALL BE INSTALLED 3–FEET O.C.

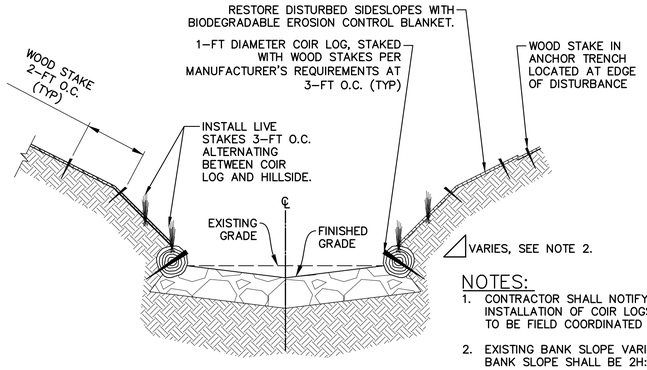
LIVE STAKE INSTALLATION DETAIL

N.T.S.



BARE ROOT DECIDUOUS TREE PLANTING DETAIL

N.T.S.



NOTES:

1. CONTRACTOR SHALL NOTIFY ENGINEER BEFORE INSTALLATION OF COIR LOGS. INSTALLATION TO BE FIELD COORDINATED WITH ENGINEER.
2. EXISTING BANK SLOPE VARIES. PROPOSED BANK SLOPE SHALL BE 2H:1V MAX.

STREAM BANK STABILIZATION

N.T.S.

GENERAL NOTES

1. PLANT MATERIAL SHALL CONFORM TO AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z260.1–2004) FOR PLANT SIZE AND CONDITION FOR SPECIFIED MATERIAL.
2. PLANT MATERIAL SHALL BE LOCALLY GROWN (PUGET SOUND REGION) AND SHALL BE IN HEALTHY AND VIGOROUS GROWING CONDITION.
3. THE CONTRACTOR SHALL SUBMIT DOCUMENTATION SPECIFYING THE QUANTITY AND SPECIES OF PLANTS WITH NAMES OF SUPPLIERS, ADDRESSES, AND PHONE NUMBERS.
4. PLANTS WILL BE INSPECTED WHEN THEY ARRIVE ON SITE TO VERIFY THEY MEET NURSERY STOCK STANDARDS. THE INSPECTOR RESERVES THE RIGHT TO REFUSE ANY AND ALL MATERIAL IF IT IS DETERMINED THAT PLANT MATERIAL DOES NOT MEET SPECIFICATION.

PLANTING SEQUENCE

1. SPREAD THREE INCHES OF TOPSOIL TYPE D ACROSS PLANTING AREAS
2. ARBORIST WOOD CHIP MULCH SHALL BE PLACED OVER THE PLANTING AREA TO A DEPTH OF THREE INCHES. THE SOIL SHALL NOT BE VISIBLE THROUGH THE WOOD MULCH.
3. PLANTING AREAS SHALL BE PLANTED WITH THE SPECIES INDICATED IN THE PLANTING SCHEDULE. PULL BACK MULCH AND DIG A HOLE FOR EACH PLANT THAT IS TWICE THE SIZE OF THE ROOT BALL OR PLANT CONTAINER. REMOVE LARGE ROCKS AND OTHER DEBRIS INCLUDING ROOTS FROM PIT. SOAK PIT WITH WATER BEFORE PLANTING. BARK MULCH SHOULD NOT BE USED TO BACKFILL THE PLANTING HOLE.
4. PULL BACK MULCH FROM PLANTINGS TO CREATE A MULCH RING AROUND PLANTS.
5. PLANTINGS SHOULD BE WATERED THROUGHOUT THE SUMMER MONTHS IF DROUGHT CONDITIONS OCCUR.

SITE RESTORATION NOTES

1. THE AREAS AND SLOPES OUTSIDE STREAMBANK AND STREAM REGRADE PLANTING AREAS THAT ARE DISTURBED FOR TEMPORARY ACCESS SHALL BE COMPLETELY RESTORED TO PRE–CONSTRUCTION CONDITIONS, NOT TO EXCEED EXISTING SLOPES, AND PLANTED IN ACCORDANCE WITH PLANS AND SECTION 8–02.
2. ALL INVASIVE VEGETATION SHALL BE REMOVED FROM WITHIN THE CLEARING AREA AND HAULED OFFSITE. ROOTS OF INVASIVE PLANTS SHALL BE GRUBBED FROM THE SOIL AND HAULED OFFSITE, SEE SPECIFICATION SECTION 8–02.2(17) PLANTING AREA WEED CONTROL.
3. ALL TREES TO REMAIN WITHIN AND DIRECTLY ADJACENT TO CLEARING LIMITS SHALL BE PRESERVED AND PROTECTED PER CITY OF BELLEVUE CLEARING AND GRADING DEVELOPMENT STANDARDS BMP T101: TREE PROTECTION REQUIREMENTS, COVERING ALL PHASES OF THE PROJECT.
4. INSTALL PLANTS PER PLANTING SPECIFICATION SECTION 8–02.2(9), BEGINNING OCT. 1.

POST-PLANTING CARE AND MAITENANCE

1. SEE PLANT ESTABLISHMENT SPECIFICATION SECTION 8–02.2(9) FOR POST–PLANT INSTALLATION REQUIREMENTS.

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DESIGNED BY IMF DRAWN BY AKS CHECKED BY TJO	OSBORN CONSULTING INCORPORATED	OSBORN CONSULTING, INC. 1800 112th Ave. NE, Suite 220E Ph (425) 451–4009 Bellevue, WA. 98004 Fax (888) 391–8517	NO.	DATE	REVISION	BY	City of Bellevue

YARROW CREEK
CITY OF BELLEVUE
PLANTING DETAILS

JOB# / DWG	DATE
10–150071_T02	2/15/19
SCALE H: N/A V: N/A	SHEET 14 of 14

TAMELE OSBORN STATE OF WASHINGTON 41694 REGISTERED PROFESSIONAL ENGINEER

ATTACHMENT 2

OSBORN CONSULTING INCORPORATED
1800 112th Avenue NE Suite 220-E | Bellevue, WA 98004 | P: 425.451.4009 | F: 425.451.4901

DATE JANUARY 22, 2019

TO PETER ROSEN, SENIOR ENVIRONMENTAL PLANNER, CITY OF BELLEVUE

CC MICHAEL GISEBERT, PE, LOUIS BERGER

FROM TARELLE OSBORN, PE, OSBORN CONSULTING, INC.
ISAAC FOURNIER, EIT, OSBORN CONSULTING, INC.

SUBJECT 2830 - 107TH AVE NE FISH PASSAGE – CRITICAL AREAS MEMORANDUM

PROJECT PURPOSE AND DESCRIPTION

This technical memorandum describes how the 107th Ave NE Fish Passage project meets the City of Bellevue Critical Areas Land Use Code performance standards for an allowed use project, prepared for the City of Bellevue.

The 107th Ave NE Fish Passage project site is located south of SR 520 in the City of Bellevue, between an office park at 3009 112th Avenue NE and an apartment complex at 10600 NE 29th Street, and is comprised of three King County Tax Parcels (2025059202, 2025059019, and 2025059010) totaling approximately 0.17 acres as shown in the attached plan set. The parcels include multi-family residences and office buildings.

The 107th Ave NE Fish Passage project will remove an existing, approximately 51-foot long, 24-inch diameter culvert and catch basin located on a west tributary of Yarrow Creek. The project will also restore the stream to an open channel. The existing culvert runs beneath an approximately 10-foot high embankment that also encloses a 10-inch sanitary sewer pipe running perpendicular to the culvert. The culvert is submerged in pools on both the upstream and downstream ends, creating a fish passage barrier. Additionally, the culvert becomes surcharged during storm events, which creates high velocities that aggravate the fish passage problem.

Fish passage will be re-established in the Yarrow tributary to satisfy an agreement between the City of Bellevue, the Washington Department of Fish and Wildlife (WDFW), and the Muckleshoot Indian Tribe (Tribe) to mitigate for a small unnamed tributary to the Mercer Slough that was not able to achieve full fish passage. In order to meet WDFW fish passage requirements, the embankment and culvert will be removed, the stream channel will be improved, and both will be done in a manner that maintains the structural integrity of the sanitary sewer pipe to cross over the stream.

The objectives of the Fish Passage project are to:

1. Remove the fish passage barrier consisting of the existing culvert and embankment in support of the City's vision and efforts to protect and enhance salmon populations.
2. Protect and maintain the active sanitary sewer pipe.
3. Design an open outfall with energy dissipater to replace the existing storm sewer catch basin outfall near the culvert.

The proposed project effectively removes the barrier to fish passage, restores ecological function, maintains the structural integrity of the of the sanitary sewer pipe, and provides adequate clearance above the 100-year water surface elevation. The project is expected to have a net increase in ecological function, and no permanent adverse impacts to the stream or stream buffer are anticipated.

The site contains streambanks that are mapped as steep slope critical areas (slopes over 40% with a minimum vertical rise of 10 feet) and a Type F fish-bearing stream. Due to the nature of the project, adjacent topography, and lack of any nearby documented wetlands, a wetland delineation has not been performed to identify the presence of wetland features. There is no mapped floodplain for the stream.

PERFORMANCE STANDARDS

The proposed project will meet the following City of Bellevue performance standards.

LUC 20.25H.055.C.2 – New or Expanded Uses or Development

The proposed project is an allowed use. The proposed project will remove the existing culvert, maintenance hole, and berm, and will restore the stream to a fish passable open channel. The existing sanitary sewer pipe will be protected with a steel casing pipe and supported by precast concrete structures located outside the ordinary high-water mark (OHWM). The structures are not expected to have any adverse impacts to the stream. The outfall system will provide energy dissipation to mitigate adverse impacts to the streambed as a result of the discharge from the removal of the existing maintenance hole. The stream will be regraded, approximately 110 feet upstream and 150 feet downstream of the sewer pipe crossing, for a total of 260 feet. The proposed channel restoration in the regraded channel will include installation of streambed sediment matching the existing gradation and pools with woody material to improve habitat function.

The new facilities and systems included in the proposed project include the sanitary sewer pipe concrete support structure and steel casing pipe. The proposed project effectively removes the barrier to fish passage, restores ecological function, maintains the structural integrity of the of the sanitary sewer pipe, and provides adequate clearance above the 100-year water surface elevation. The project is expected to have a net increase in ecological function, and no permanent adverse impacts to the stream or stream buffer are anticipated.

Disturbance of the critical area, critical area buffer, and vegetation will be minimized. Care has been taken in order to minimize the removal of trees to the maximum extent feasible. The width and alignment of construction access were designed in order to avoid unnecessary impacts to trees and other native vegetation. Invasive species will be removed in disturbed areas, and native vegetation restored following construction. Approximately 11 bigleaf maple, 8 red cedar, and 2 poplar, along with various shrubs, are expected to be removed from the area within the stream regrade limits. A mitigation plan has been prepared that includes planting of native trees and shrubs, as well as installation of Pacific willow live stakes in the stream regrade area, which includes planting areas below the OHWM. 1958 square feet of enhanced stream buffer plantings will be added to the design based on an evaluation conducted by Kit Paulsen with the City of Bellevue in order to densely vegetate the outer stream buffer.

Temporary impacts during construction will be minimized by implementing Best Management Practices and by following WDFW approved in-water work window protocols.

The general design was presented as a removal of the existing undersized culvert and restoration of the open channel with the sewer pipe encased and supported above the channel. The Tribe requested investigation of a second option to install a stream simulation culvert that would be installed beneath the sewer pipe and allow the berm to remain. The Tribe questioned whether this method would provide

additional support to the sewer pipe. This option was investigated by Osborn Consulting, Inc., and it was determined that the stream simulation culvert was not feasible due to the reduced clearance above the channel created by the culvert thickness. The cost of the stream simulation culvert was also determined to likely be prohibitive. The City prefers to encase and support the sewer pipe, and has reported success using this method at other locations. All work will be consistent with applicable City of Bellevue codes and standards.

LUC 20.25H.055.C.3.d – Instream Structures

There are no instream structures planned for this project. The proposed concrete support structures will be located outside the OHWM and beneath the design scour depth.

LUC 20.25H.080.A – Performance Standards - General

1. *Lights shall be directed away from the stream.*
    - There will not be any change in lighting in the project area. Potential sources of light are from the office and apartment buildings and parking lots to the north and west of the culvert crossing. Affected areas within the project area will be replanted with native trees and shrubs that will provide shade for any lights in the area.

2. *Activities that generate noise, such as parking lots, generators, and residential uses shall be located away from the stream or any noise shall be minimized through the use of design and insulation techniques.*
    - No new development that generate noise shall be added as part of this project.

3. *Toxic runoff from new impervious area shall be routed away from stream.*
    - No new impervious area shall be added as part of this project.

4. *Treated water may be allowed to enter the stream critical area buffer.*

5. *The outer edge of the stream critical area buffer shall be planted with dense vegetation to limit pet or human use. Preference shall be given to native species.*
    - Affected areas within the stream buffer will be mitigated with native trees and shrubs according to the planting plan.

6. *Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream critical area buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.*
    - Use of fertilizer for plant establishment within 150-feet of the stream buffer will be in accordance with the City of Bellevue's Environmental Best Management Practices. Pesticides and insecticides are not expected to be used as part of the project.

LUC 20.25H.080.B – Performance Standards – Modification of a Stream Channel

Modification of the stream channel will not include relocation of the open channel or closing of the channel through pipes or culverts. The project is a habitat improvement project that will remove the existing fish barrier culvert and re-open the stream channel. The project is allowed use and therefore does not require a critical areas report.

CONCLUSION

Based on the City of Bellevue Critical Areas Land Use Code requirements, the 107th Ave NE Fish Passage project meets the performance standards for an allowed use project. The project will effectively remove the barrier to fish passage, protect the sanitary sewer pipe, and enhance ecological function of the stream.

REFERENCES

City of Bellevue, 2018. Storm and Surface Water Engineering Standards. City of Bellevue Utilities Department.

City of Bellevue, 1997. Bellevue City Code, Title 20 Land Use Code, https://bellevue.municipal.codes/LUC

ATTACHMENT 3

Utilities

TO: **Jay Hummel, Isaac Fournier**
FROM: **Kit Paulsen, Environmental Scientist**
DATE: **Jan. 14, 2019**
SUBJECT: **Yarrow Tributary (10418 SE 29th ST) buffer enhancement opportunities**

At the request of Jay Hummel, on Jan. 14, 2019, I conducted a site visit with Isaac Fournier to the 10418 SE 29th St. Yarrow Tributary enhancement site to evaluate opportunities for enhanced buffer planting areas.

Recommendations

There are two stream bank areas that could benefit from additional native vegetation. These are marked as areas 1 and 2 on the Areas of Investigation map below. Other stream bank areas are either too steep or have good coverage of native vegetation or both. The steep bank areas would require additional slope stabilization to effectively install native plants. Additional work in steep areas that have reasonable levels of native plant coverage would probably cause more damage than the limited increase in coverage would gain.

Areas of investigation

Opportunities for Enhanced Buffer Planting

Area 1

Upstream of the sewer crossing, the western bank below the multi-family property has limited vegetation, most of which was non-native ivy and Himalayan Blackberry. There is a slight terrace area aligned with the sewer manhole below which enhanced buffer planting would be beneficial (see map area marked "1").

Recommended native plants

Area 1 could benefit from additional conifer and deciduous tree planting, including Big Leaf Maple (*Acer macrophyllum*), Western Red Cedar (*Thuja plicata*), and Douglas fir (*Pseudo-tsuga menziesii var. menziesii*) on the upper terrace area. Recommended shrubs for this area include: Pacific willow (*Salix lucida ssp. lasiandra*), Sitka willow (*Salix Sitchensis*), and Red-twig dogwood (*Cornus sericea ssp occidentalis*) near the stream, with black hawthorn (*Crataegus douglasii*), beaked hazelnut (*Corylus cornuta var. californica*), sword fern (*Polystichum munitum*) and salmonberry (*Rubus spectabilis var spectabilis*) on the terraced area. The multi-family side of this area could be planted with Clustered Wild Rose (*Rosa pisocarpa*) to discourage movement into the stream area.

Area 2

Downstream of the sewer crossing on the eastern bank, near the Corporate Center, there is opportunity to plant approximately a 15-foot buffer (see map area marked "2").

Recommended native plants

This area has good canopy coverage, so restoration should focus on the shrub layer. Recommended shrubs for Area 2 include: Pacific willow (*Salix lucida ssp. lasiandra*) and Sitka willow (*Salix Sitchensis*) near the stream, with black hawthorn (*Crataegus douglasii*), beaked hazelnut (*Corylus cornuta var. californica*), sword fern (*Polystichum munitum*) and salmonberry (*Rubus spectabilis var spectabilis*). The outer edges of the planting could be planted with Clustered Wild Rose (*Rosa pisocarpa*) to discourage movement from the Corporate Center into the stream area.

Additional Potential Planting Area

Additional planting along the stream north of Area 2 towards the parking lot and construction access area would be beneficial for stream function but would encroach on the Corporate Center lawn. Work in this area would require additional easements or approval from the property owner.

If permission is sought and granted, then potential plants include: Pacific willow (*Salix lucida ssp. lasiandra*), black hawthorn (*Crataegus douglasii*), beaked hazelnut (*Corylus cornuta var. californica*), Red-twig dogwood (*Cornus sericea ssp occidentalis*) and Clustered Wild Rose (*Rosa pisocarpa*) on the Corporate Center side.

Additional Planting Note

There are currently several non-native conifers providing substantial cover and function. It is recommended that these conifers are maintained. The tree canopy from these non-native conifers

should be noted that they are not to be incorporated into the “non-native weed” coverage in the permit performance standards.

Photos

Area 1 – remove non-native invasive weed species, install native trees and shrubs.

Area 2 – remove non-native invasive weeds, plant native shrubs.

Corporate Center Potential Additional Area – plant native shrubs.

<u>Areas Not Recommended for Enhanced Buffer Planting</u>

There are three areas that would be challenging for enhanced buffer planting.

1) I would not recommend moving westerly of Area 1 towards the multifamily building due to the steep slopes. Work in that steep area would require additional slope stabilization to be successful.

2) The East Bank of the upstream area is currently well vegetated with sword fern and trees on very steep slopes. Additional work in this area could compromise the existing vegetation and could increase slope instability.

3) Downstream of the sewer crossing, the West Bank has well established sword ferns and trees with some shrub layer. As upstream, this is a very steep area with limited opportunities for understory planting.

East Bank Above Sewer Crossing

West Bank below Sewer Crossing

ATTACHMENT 4

OSBORN CONSULTING INCORPORATED

1800 112th Avenue NE Suite 220-E | Bellevue, WA 98004 | P: 425.451.4009 | F: 425.451.4901

DATE NOVEMBER 30, 2018

TO KAREN WALTER, WATERSHED AND LAND USE TEAM LEADER, MUCKLESHOOT INDIAN TRIBE

CC JAY HUMMEL, PE, CAPITAL PROJECTS MANAGER, CITY OF BELLEVUE

FROM TARELLE OSBORN, PE, ISAAC FOURNIER, EIT, OSBORN CONSULTING, INC.

SUBJECT 2830 - 107TH AVE NE FISH PASSAGE – MUCKLESHOOT INDIAN TRIBE COMMENT RESPONSE

In response to the questions and initial comments from Karen Walter from the Muckleshoot Indian Tribe:

For the project that is proposed on a West Tributary to Yarrow Creek, we have some questions and initial comments:

1. ***More trees will be removed than are proposed to be placed back into the stream channel. The project should be putting all trees removed that are 4 inches in diameter or greater and within 200 feet of the stream back into the stream as partial mitigation for impacts to future wood recruitment function.***

The following is the Habitat Features section from the Basis of Design report:

HABITAT FEATURES

A pool with woody material both upstream and downstream of the sewer pipe crossing are included in the proposed design. Woody material will be sourced from on-site trees that are removed as part of the berm removal. Pools and woody material will be designed to accomplish the following:

- Reduction of velocity in localized areas at the pool or woody material locations.
- Control of stream grade transitions and sediment dynamics within the stream system.
- Creation of shaded, low-velocity resting areas for fish and shelter from potential predators.

Upstream of the proposed stream regrade area, the existing stream channel slopes at an average of 3 percent then gradually flattens and pools upstream of the existing culvert and berm. The stream in the project area is highly influenced by the culvert both upstream and downstream. The culvert is submerged in large pools on both the upstream and downstream ends, and is potentially partially blocked with sediment and debris. A small pool exists on the upstream extent of the stream regrade area. Downstream of the pool at the culvert outlet, the stream slopes at an average 1.5 percent then flattens out to 1 percent at the downstream extent of the stream regrade area. The channel appears to be incised through portions of the Yarrow tributary reach. Incision of the stream channel may potentially have been caused by the constrained stream due to nearby developments. Portions of the stream were located in areas constrained by a steep slope along the west bank, and by the parking lot

for the office park along the east bank. There are very few natural pools in the stream regrade area downstream of the existing culvert.

The channel profile and slope changes were designed to reflect the natural channel as well as promote sediment transport and minimize aggradation below the sewer pipe crossing. Woody material placement will be limited to the two habitat pools upstream and downstream of the existing culvert location to prevent sediment recruitment and deposition below the sewer pipe crossing. Excess woody material placement could potentially create an upstream sediment wedge that would decrease the channel gradient and reduce downstream bedload conveyance. Sediment deposition must be minimized in order to protect the integrity of the sanitary sewer pipe crossing and comply with the clearance requirements in WDFW's Water Crossing Design Guidelines.

2. ***More details are needed regarding the existing and proposed sediment sizes to be used for streambed material.***

The following is the Streambed Material section from the Basis of Design report:

STREAMBED MATERIAL

OCI conducted field visits performed 4 pebble counts within the study area to characterize the existing grain size distribution of the sediment in the streambed both upstream and downstream of the culvert location. An 84th percentile particle size (D_{84}) value of 2.19 inches was found to be present within the project limits. The Pebble Count Documentation Memorandum (Osborn Consulting, Inc., 2018) is included as **Attachment 2.**

A streambed mobility and stability analysis was performed to determine the proposed streambed material gradation. The streambed gradation was developed based on unit-discharge, shear stress and scour potential calculations using the following design guidance:

- Water Crossing Design Guidelines, WDFW, 2013
- Integrated Streambank Protection Guidelines, WDFW, 2003

The streambed material sizing and channel scour calculations are included as **Attachment 3**.

The 84th percentile particle in the proposed sediment distribution was determined to be 4 inches using the paleohydraulic method and flows from the 100-year HEC-RAS model. The required streambed material size of 4 inches was identified based on the calculated bed and bank shear stress. The potential depth of scour was determined to be 1.45 feet.

Despite the smaller existing particle size within the stream, it is recommended that the streambed material gradation be characterized based on a D_{84} particle size of 4 inches. The existing culvert has prevented natural sediment transport and is currently submerged on both the upstream and downstream ends. Evidence of bank degradation has been observed downstream which could increase after removal of the culvert. The recommended gradation will provide future channel stability, prevent potential downstream impacts, and protect the integrity of the sewer pipe support structure.

3. Is there a Basis of Design report that describes further the project design details? If yes, we request a copy for our review. We'd like to see how the restored stream will compare to the existing stream for elements such as streambed gradients, streambed material sizing, existing pools and proposed pools using stream design and wood, etc.

The Basis of Design report that describes the project design details is included for your review.